Size Code SOM

MICRO-MAINFRAME USER QUESTIONNAIRE

INPUT is conducting a study on the issues involved in linking microcomputer host systems and data. We will make recommendations on how corporations can best deal with these issues in the coming years. We would like your organization to take part in this study by describing what you are doing now, what your plans are and what problems you see. This information will be used by IS departments in their planning and will also be used by a wide variety of information service vendors to offer more useful products and services.

None of the information that you provide will be associated with your company. In return for your taking part in this study, we will send you a summary of this study on its completion and will also send you a summary of INPUT's report on "PC Software Support in Large Corporations."

1) How many personal computers are in use within your company:
(If no PCs are used or planned by the end of 1985, end interview.)

(1) PC growth

	Now	End of 1984	End of 1985
Total all types	134	298	452
IBM PC XT/370 or 3270/PC	~~134~~ 9	~~298~~ 25	~~452~~ 43
IBM PC except XT/370 or 3270/PC and IBM PC SW/data compatible types	96	~~35~~ 151	~~45~~ 180
UNIX-based systems	0	0	4
Other personal computer types	31	35	46

(Total should equal sum of parts)

(2) UNIX

2.a) How will the UNIX-based systems be used? F1

2.b) In the future, how important do you see UNIX-based systems being to your organization's plans? (1=low importance, 5=high importance)

UNIX-based systems 1.8

Why? (4)

3.a) In the long run, how important do you see the XT/370 in your organization's plans? (1=low importance, 5=high importance)

XT/370 2.3

Why? (3) F3

The 3270/PC? 2.9

Why? (6) F4

3.b) How well would you rate your organization's current understanding of the capabilities of the XT/370 and the 3270/PC? (1=low degree of understanding, 5=high degree of understanding)

XT/370 2.6 3270/PC 2.8

Please give me some examples of particular areas where your organization requires additional information on the capabilities of the XT/370 and the 3270/PC. (PROMPT AS NECESSARY: for example, what has to be done to permit current applications software to run on the XT/370, how concurrent data bases will be handled, etc?)

XT/370 F5

3270/PC F6

??

4.a) How many multiuser microcomputer systems (e.g., Altos) and local area networks (LAN's) do you now have installed? Who are the vendors? What are these systems being used for?

	Multiuser Micros	LAN's
Number of installations	5	1
Vendors	F7	
Applications/ Uses	F8	

4.b) How many multiuser micros and local area networks do you expect to have installed in two years? What new uses will you have?

	Multiuser Micros	LAN's
Number of installations	30	32
Vendors	F11	F13
Applications/ Uses	F12	F14

5. In the future, what will the relative importance be to your organization of the following kinds of microcomputers? (1=low importance, 5=high importance) Why? (READ EACH ITEM BELOW)

	Rating	Reason Why
Standalone personal computers running personal computer software? (e.g., IBM PC/XT)	3.4	11 F15
Standalone personal computers running mainframe software? (e.g., XT/370)	2.4	12 F16

5. (continued)

	Rating	Reason Why
Personal computers in local area networks?	2.3	(13)
Mainframe terminals that also have personal computer capabilities (e.g., 3270/PC)	3.5	(14)

Sort 4 & 5 / 0-3

6. On a scale of 1 to 5 with 1 representing low importance and 5 representing high importance, how would you rate the following functional areas? In two years how would your importance rating change for these? Why the change?

	Now (15)	Two Years	Reason for Change
Spreadsheet packages using local data	4.1	3.8	(16) F19
Spreadsheet packages using downloaded data	2.9	4.2	(17) F21
Vendor application packages for PCs	3.6	3.9	(18) F21

Sort 4-5 / 0-3

6. (continued)

	Now	Two Years	Reason for Change
In-house developed programs for PCs (including fourth-generation languages)	2.2	2.9	19

F23

7.a) The next set of questions relate to so-called micro-mainframe application systems. For the purposes of this study, we are defining this to mean the following: "Applications in which neither the mainframe host nor a microcomputer can fully carry out an activity without utilizing processing capabilities or data from the other." Do you agree with this definition?
Yes ( ) 85% No ( )

7.b) If "No:" Please tell me how you would modify it: not tabbed

8. With +5 representing agreement and -5 representing disagreement to what extent do you agree that "Within three to five years most applications that are now host-based will have a considerable amount of functionality taken over by personal computers that are linked to the host." 1.7

Why? F23

Sort 3 grps
+4+5
+1+3
0 & all neg

20 ↓ dist

58/78 = agree
70%
2.97

mtc 75
63

9. Do you believe that links between host computers and micros will be predominantly interactive, predominately on-line batch, or about the same? (READ DEFINITION IF NEEDED)

DEFINITION: ON-LINE BATCH - where the micro performs processing on a standalone basis and, periodically, the personal computer and the host exchange data; the host may then further process the data received.

Sort
3 grps

Predominantly interactive 37 ( ) 28
Predominantly on-line batch 25 ( ) 19
About the same 38 ( ) 29

Reason why _____

10. In constructing micro-mainframe systems how common do you think each of the following approaches will be? (READ LIST BELOW) Why? (1=very common, 5=not common) NOTE: ALL OPTIONS MAY BE RATED "NOT COMMON" OR "VERY COMMON" - OPTIONS ARE NOT MUTUALLY EXCLUSIVE

	Rating	Reason Why
Modification of existing software	3.3	
Use existing data base but write new application code	2.5	
Write entirely new applications	2.7	

11.a) Generally, to what extent do you see data base linkage and synchronization as a serious problem in establishing micro-mainframe links? (1=not a problem, 5=a serious problem) 3.4

11.b) How serious is this problem for systems used for analysis? (e.g., spreadsheets) 3.0

Why? _____

11.c) How serious is this problem for production systems? (e.g., order entry, payroll) 3.1

Why? _____

11.d) What can an organization like yours do to solve these kinds of data base linkage and synchronization problems? _____

12.a) Do you see backup and security as significant barriers to expanded use of linked micro-mainframe applications? Yes ( ) No ( )

If "no" skip to question 13.

12.b) What are the major problems that you see? _____

12.c) What can an organization like yours do to solve these problems? _____

12.d) What solutions can vendors provide? _____

13.a) For your own organization, what specific applications do you see as being the most suitable as micro-mainframe applications? (They need not be computerized applications now.) (Use workspace below.)

13.b) Are these applications planned and if so at what stage are you at implementing them (i.e., do not have concrete plans, are in the planning stage, applicatons are being developed, applications are already implemented)? (Use workspace below.)

13.c) Do you expect to develop these applications in-house, purchase an existing package from an outside vendor, or modify in-house an existing package? (Use workspace below.)

33

Application Name	Stage F35 etc				Source F36 etc		
	None	Plan	Dev.	Imp.	In-house	Vendor	Both
1. Other Pgr F34 etc							
2.							
3.							
4.							
5.							

Comments:

Sort?

1.
2.
3.
4.
5.

14.a) Do you have electronic mail? Yes (35) No ( )

If "No" skip to question 15.

14.b) How many users currently use the electronic mail now? In two years?

Now 62 Total in two years 300

14.c) On the average, how many messages are now sent via electronic mail per month? In two years?

Now 12K Total in two Years

14.d) What percentage of this change in electronic mail use do you expect to be attributable to microcomputers? 15 %

15.a) In what ways to you see micro-mainframe applications increasing your data communications requirements? _____

30

F 57

15.b) In what ways do you see micro-mainframe applications decreasing your data communications requirements? _____

F55

15.c) Overall, do you think that the net effect will be to increase or decrease your data communications requirements? By what percent?

Increase: ~~15~~ 25 % Decrease: _____% No effect: _____

Sort 4-5 0-3

16.a) With 1 representing low importance and 5 representing high importance, how important will it be for your company's micros to communicate with micros in other departments? 3.0

Why? _____

F56

57

See matrix 16.b) What type of communication facility will your firm be likely to use for this type of communication? (Use ~~workspace~~ matrix below.) _____

F57

Sort 3-5 0-2

17.a) With 1 representing low importance and 5 representing high importance, how important will it be for your company's micros to communicate with mainframes in other companies (i.e., suppliers, customer)? 2.3

Why? _____

F58

17.b) What types of communication facilities will your firm be likely to use for this type of communication? (Use workspace below.) _____

F59

18.a) With 1 representing low importance and 5 representing high importance, how important will it be for your company's micros to communicate with public data bases? 2.5

Why? F60

18.b) What types of communication facilities will your firm be likely to use for this type of communication? (Use workspace below.) _____

F61

Type of Communication Facility	Micros in other departments	Mainframes in other companies	Public data bases
LAN			
Existing network			
Leased lines			
Wats			
Dial up			
Public data network			
Other			

19.a) Do you expect your company's micros to be linked to more than one type of mainframe (e.g., IBM and DEC)? Yes ( ) No ( )

If "No" skip to question 20.

F62

19.b) What would be the most common types of mainframe linkages? F63

19.c) Would, typically, the same micro have to link to more than one kind of mainframe at different times? Yes ( ) . No ( )

20. Do you expect that your company's micros will be linked to more than one type teleprocessing environment? (e.g., to both TSO and CMS, or CICS and IMS DC) Yes (39) No ( )

If "Yes:"

20.b) Which ones? F64

20.c) Would, typically, the same micro have to link to more than one kind of software environment at different times? Yes (52) No ( )

21.a) Do you expect that your company's micros will be linked to more than one type of data base management system? (e.g., to both IMS and IDMS) Yes ( ) 49 No ( )

If "Yes:"

21.b) Which ones? F65

21.c) Would, typically, the same micro have to link to more than one kind of DBMS at different times? Yes ( ) 47 No ( )

22.a) Do you expect microcomputer use in your company to accelerate the use of relational data base systems in your company? Yes ( ) 49 No ( )

If "No" skip to question 23.

22.b) Which one? F66

٢٥٦
٥١٣

22.c) Would this data base be located on a regular mainframe ( ) or have a special machine ( ) devoted to it? IF SPECIAL MACHINE: Which one? _____

F67

F68

not coded

23.a) With 1 representing no assistance and 5 representing much assistance how much assistance generally do your expect to be able to get from vendors in helping your organizations in planning and implementing your organization's critical micro-mainframe applications? 2.7

23.b) More specifically, how would you rate:

Vendor Type	Rating	Reason Why
Microcomputer hardware vendors (except for IBM)	2.1	(50) F69
IBM	2.8	(51) F70
Software vendors who primarily offer mainframe software	2.6	(52) F71
Software vendors who offer both mainframe and microcomputer software	2.9	(53) F72

Sort reasonably 1-2 3-5

Sort 3-5 0-2

Sort 3-5 0-2

23.b) (continued)

Vendor Type	Rating	Reason Why
Remote processing (timesharing) vendors (e.g., McAuto, Boeing Computer Services)	1.5	54 F73
Integrated systems (turnkey) vendors	2.0	55 F74
Professional services and consulting firms	2.4	56 F75

24. What current problems do you see micro-mainframe systems solving or alleviating? 57 F76

25.a) What problems do you see being created or aggravated by micro-mainframe systems? 58 F77

25.b) How do you think that these new problems should be dealt with? 59 F78

- THANK YOU -

TRAC LINE

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April 12, 1984

Mr. Thomas O'Flaherty
INPUT
Park 80 Plaza West-1
Saddle Brook, NJ 07662

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I have enclosed reproduction of our entire advertising series. These should be suitable for your printing needs. However, if they are not, please call me directly and I will have stats sent to you from our advertising agency.

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Mary Clark
Director of Marketing
Communications

MC:ng
Enclosures

BY INDUSTRY

IN	UNIMP	XT370	IMP3270	NOW SSLOC	SSLOC	SSDLN	SSDLF	VENDN	VENDF	IHNOW	IHFUT	
1	1.0	1.0	3.0	2.0	3.0	2.0	3.0	4.0	4.0	2.0	2.0	
1	2.0	2.0	3.5	5.0	5.0	5.0	5.0	4.0	4.0	1.0	1.0	
1	3.0	4.0	1.0	5.0	5.0	2.0	2.0	3.0	4.0	1.0	1.0	
1	1.0	1.0	1.0	2.0	1.0	1.0	4.0	3.0	3.0	1.0	1.0	
1	1.0	2.5	1.0	4.0	5.0	4.0	5.0	3.0	3.0	2.0	2.0	
1	1.0	4.0	3.0	3.0	3.0	5.0	5.0	4.0	4.0	3.0	3.0	
1	4.0	1.0	1.0	5.0	5.0	4.0	5.0	5.0	5.0	5.0	5.0	
1	0.0	3.0	3.0	5.0	5.0	3.0	5.0	3.0	3.0	3.0	3.0	
1	3.5	1.0	1.0	3.0	3.0	3.0	4.0	3.0	3.0	3.0	4.0	
1	2.0	2.5	1.5	4.0	4.0	5.0	5.0	5.0	5.0	5.0	5.0	
1	3.0	0.0	1.0	5.0	5.0	1.0	1.0	4.0	4.0	1.0	1.0	
1	3.0	2.0	1.0	3.0	3.0	2.0	4.0	4.0	4.0	3.0	1.0	
1	3.0	5.0	0.0	4.0	4.0	5.0	5.0	5.0	5.0	1.5	1.5	
1	4.0	1.0	1.0	5.0	4.0	5.0	5.0	3.0	3.0	4.0	5.0	
1	1.0	2.0	4.0	5.0	5.0	1.0	2.0	4.0	4.0	2.0	5.0	
1	4.0	4.0	2.0	4.0	2.0	4.0	5.0	2.0	4.0	1.0	5.0	
16	36.5	36.0	28.0	64.0	62.0	52.0	65.0	59.0	62.0	38.5	45.5	Sum
1	2.3	2.3	1.8	4.0	3.9	3.3	4.1	3.7	3.9	2.4	2.8	Ave
0	1.7	2.0	1.4	1.2	1.6	2.5	1.8	0.8	0.5	1.9	3.0	Var
0	1.3	1.4	1.2	1.1	1.3	1.6	1.3	0.9	0.7	1.4	1.7	Sdv
1	0.0	0.0	0.0	2.0	1.0	1.0	1.0	2.0	3.0	1.0	1.0	Min
1	4.0	5.0	4.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	Max

Number of Observations: 16

2	2.0	4.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
2	0.0	5.0	5.0	5.0	5.0	3.0	5.0	4.0	5.0	3.0	2.0	
2	2.0	2.0	3.0	4.0	4.0	1.0	3.0	2.0	2.0	0.0	1.0	
2	1.0	1.5	4.5	5.0	3.0	1.0	3.5	5.0	5.0	1.0	1.0	
2	1.0	3.5	3.5	3.0	4.5	3.0	4.5	3.0	3.0	1.0	1.0	
2	1.0	1.0	3.0	2.0	3.0	1.0	2.0	3.0	3.0	1.0	2.0	
2	0.0	3.0	4.0	5.0	5.0	5.0	5.0	5.0	5.0	1.0	3.0	
2	1.0	0.0	0.0	4.0	2.0	2.0	4.0	5.0	5.0	1.5	3.0	
2	1.0	4.0	3.0	3.0	3.0	4.0	5.0	0.0	0.0	4.0	4.0	
2	0.0	1.0	3.0	3.0	1.0	1.0	1.0	2.0	2.0	3.0	3.0	
2	5.0	3.0	3.0	5.0	5.0	3.0	5.0	2.0	3.0	5.0	5.0	
2	0.0	1.0	1.0	5.0	5.0	5.0	5.0	5.0	5.0	1.0	1.0	
2	4.0	1.0	3.0	4.0	4.0	2.0	5.0	5.0	5.0	1.0	2.0	
2	1.0	1.0	0.0	4.0	4.0	0.0	3.0	0.0	4.0	3.0	3.0	
2	1.0	1.0	1.0	3.0	1.0	1.0	4.0	2.0	5.0	1.0	4.0	
2	2.0	3.0	3.0	5.0	5.0	5.0	5.0	4.0	4.0	2.0	4.0	
2	1.0	3.0	4.0	4.0	3.0	3.0	5.0	5.0	5.0	1.0	4.0	
2	4.0	2.0	4.0	4.0	3.0	3.0	4.0	5.0	5.0	2.0	3.0	
2	2.0	2.0	4.0	5.0	4.0	1.0	4.0	4.0	4.0	1.0	4.0	
2	2.0	2.0	2.0	5.0	4.0	2.0	4.0	5.0	4.0	1.0	2.0	
2	1.0	4.0	4.0	5.0	5.0	2.0	4.0	5.0	5.0	1.0	3.0	
2	1.0	1.0	4.0	5.0	4.0	5.0	5.0	4.0	4.0	1.0	2.0	
2	2.5	2.0	4.5	4.0	4.0	2.0	3.5	4.0	4.0	1.5	3.0	
2	0.0	3.0	4.0	2.0	4.0	2.0	2.0	0.0	0.0	1.0	1.0	
2	1.0	5.0	4.0	4.0	4.0	5.0	5.0	5.0	5.0	3.0	4.0	
2	2.0	1.0	3.5	2.0	1.5	0.5	2.0	2.0	2.5	1.5	0.5	
52	38.5	60.0	83.0	105.0	96.0	67.5	103.5	91.0	99.5	47.5	70.5	Sum

IN	UNIMP	XT370	IMP32	SSLOC	SSLOC	SSDLN	SSDLF	VENDN	VENDF	IHNOW	IHFUT	
2	1.5	2.3	3.2	4.0	3.7	2.6	4.0	3.5	3.8	1.8	2.7	Ave
0	1.6	1.9	1.9	1.1	1.5	2.6	1.4	3.0	2.3	1.7	1.7	Var
0	1.3	1.4	1.4	1.0	1.2	1.6	1.2	1.7	1.5	1.3	1.3	Sdv
2	0.0	0.0	0.0	2.0	1.0	0.0	1.0	0.0	0.0	0.0	0.5	Min
2	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	Max

Number of Observations: 26

5	5.0	2.0	4.0	3.0	3.0	3.0	4.0	3.0	3.0	4.0	4.0	
5	3.0	2.0	2.0	5.0	2.0	1.0	5.0	5.0	5.0	4.0	5.0	
5	4.5	1.5	1.0	5.0	5.0	4.0	4.0	4.0	4.0	4.5	4.5	
5	2.0	3.0	3.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0	2.0	
5	3.0	2.5	1.5	2.0	2.0	5.0	5.0	5.0	5.0	4.0	4.0	
5	1.5	2.0	2.5	4.0	3.0	2.0	4.0	5.0	3.0	1.0	3.0	
5	1.0	1.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0	2.0	
5	4.0	1.0	3.0	5.0	5.0	2.0	2.0	3.0	3.0	5.0	5.0	
5	3.0	5.0	5.0	5.0	5.0	5.0	5.0	4.0	4.0	4.0	4.0	
5	3.0	1.0	1.0	5.0	5.0	5.0	5.0	5.0	5.0	4.0	4.0	
5	1.0	5.0	0.0	5.0	5.0	5.0	5.0	1.0	1.0	2.0	2.0	
55	31.0	26.0	28.0	49.0	45.0	42.0	49.0	45.0	43.0	36.5	39.5	Sum
5	2.8	2.4	2.5	4.5	4.1	3.8	4.5	4.1	3.9	3.3	3.6	Ave
0	1.8	2.1	2.7	1.1	1.7	2.4	0.9	1.7	1.7	1.7	1.3	Var
0	1.3	1.5	1.7	1.0	1.3	1.5	0.9	1.3	1.3	1.3	1.2	Sdv
5	1.0	1.0	0.0	2.0	2.0	1.0	2.0	1.0	1.0	1.0	2.0	Min
5	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	Max

Number of Observations: 11

8	3.0	2.0	4.5	5.0	4.0	1.0	5.0	5.0	5.0	1.0	1.0	
8	1.0	4.0	4.0	4.0	5.0	4.0	5.0	2.0	5.0	2.0	3.0	
8	1.0	1.0	4.0	4.0	4.0	2.0	4.0	3.0	1.0	2.0	2.0	
8	2.0	2.0	3.0	2.0	1.0	4.0	4.0	4.0	4.0	5.0	5.0	
8	1.0	4.0	4.0	3.0	3.0	3.0	4.0	2.0	4.0	3.0	3.0	
8	0.0	4.0	4.0	5.0	5.0	2.0	4.0	5.0	5.0	1.0	1.0	
8	1.0	0.0	4.0	5.0	4.0	2.0	4.0	2.0	0.0	2.0	2.0	
8	0.0	0.0	3.0	5.0	3.0	1.0	4.0	5.0	5.0	1.0	1.0	
8	3.0	1.0	1.0	1.0	4.0	0.0	4.0	0.0	4.5	0.0	3.0	
8	0.0	0.0	4.0	4.0	3.0	1.0	5.0	2.0	3.5	2.0	5.0	
8	0.0	2.0	3.0	4.0	4.0	1.0	2.0	2.0	4.0	2.0	3.0	
8	0.0	4.0	5.0	5.0	5.0	1.0	5.0	5.0	5.0	2.0	3.0	
8	1.0	2.5	3.5	4.0	4.0	3.0	4.0	5.0	5.0	3.5	4.0	
8	1.0	4.0	4.0	5.0	5.0	5.0	5.0	5.0	5.0	3.0	3.0	
8	3.0	0.0	4.5	4.0	3.0	5.0	5.0	5.0	5.0	1.0	2.0	
8	1.0	3.0	2.0	5.0	5.0	4.0	4.0	5.0	5.0	2.0	2.0	
8	2.0	1.0	1.0	3.0	2.0	2.0	4.0	4.0	4.0	2.0	2.0	
8	2.5	4.5	4.5	4.0	2.0	2.0	4.0	4.0	4.0	2.0	2.0	
**	22.5	39.0	63.0	72.0	66.0	43.0	76.0	65.0	74.0	36.5	47.0	Sum
8	1.3	2.2	3.5	4.0	3.7	2.4	4.2	3.6	4.1	2.0	2.6	Ave
0	1.2	2.7	1.3	1.3	1.4	2.3	0.5	2.5	2.0	1.2	1.4	Var
0	1.1	1.6	1.2	1.1	1.2	1.5	0.7	1.6	1.4	1.1	1.2	Sdv
8	0.0	0.0	1.0	1.0	1.0	0.0	2.0	0.0	0.0	0.0	1.0	Min
8	3.0	4.5	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	Max

IN	UNIMP	XT370	IMP32	SSLOC	SSLOC	SSDLN	SSDLF	VENDN	VENDF	IHNOW	IHFUT	
Number of Observations:		18										
11	1.0	5.0	3.0	5.0	5.0	2.0	4.0	1.0	2.0	0.0	3.0	
11	0.0	3.0	3.0	5.0	3.0	5.0	5.0	5.0	5.0	3.0	3.0	
11	0.0	1.0	1.0	3.0	5.0	2.0	4.0	3.0	5.0	1.0	2.0	
11	3.0	2.0	5.0	5.0	5.0	2.0	5.0	3.0	3.0	5.0	5.0	
11	3.0	1.5	4.0	4.0	4.0	4.0	4.0	3.0	3.0	3.0	4.5	
11	0.0	2.0	3.0	4.0	4.0	2.0	5.0	4.0	4.0	2.0	4.0	
11	1.0	2.0	4.0	5.0	4.0	2.0	4.0	3.0	3.0	1.0	1.0	
77	8.0	16.5	23.0	31.0	30.0	19.0	31.0	22.0	25.0	15.0	22.5	Sum
11	1.1	2.4	3.3	4.4	4.3	2.7	4.4	3.1	3.6	2.1	3.2	Ave
0	1.8	1.7	1.6	0.6	0.6	1.6	0.3	1.5	1.3	2.8	2.0	Var
0	1.3	1.3	1.3	0.8	0.8	1.3	0.5	1.2	1.1	1.7	1.4	Sdv
11	0.0	1.0	1.0	3.0	3.0	2.0	4.0	1.0	2.0	0.0	1.0	Mir
11	3.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	Max
Number of Observations:		7										
**	136.5	177.5	225.0	321.0	299.0	223.5	324.5	282.0	303.5	174.0	225.0	Sum
4	1.8	2.3	2.9	4.1	3.8	2.9	4.2	3.6	3.9	2.2	2.9	Ave
11	1.8	2.0	2.1	1.1	1.4	2.5	1.1	2.1	1.6	1.9	1.9	Var
3	1.4	1.4	1.4	1.0	1.2	1.6	1.0	1.4	1.3	1.4	1.4	Sdv
1	0.0	0.0	0.0	1.0	1.0	0.0	1.0	0.0	0.0	0.0	0.5	Mir
11	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	Max
Number of Observations:		78										

Undefined name: REMOTETK
Error found when evaluating expressions

Page 1

	CATNUMB	14D PERCN	15C PERCI	15C PERCD	15C N	16A MIC	17A MIC	18A PUB	M	T	M	D	D	R	23A ASS	23A MIC	IBM	SWM SWMS	SWM SWMS	REM	TKEy	PSC
0	utpm002	0.0	0.0	0.0	1	1.0	1.0	2.0	1	1	1	0	0	0	3.0	1.0	1.0	4.0	0.0	0.0	0.0	4.0
0	utpm003	0.0	25.0	0.0	0	5.0	1.5	2.0	1	1	1	1	1	0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
1	utpm004	0.0	10.0	0.0	0	1.0	1.0	1.0	1	1	1	1	1	0	3.0	4.0	4.0	3.0	4.0	1.0	1.0	1.0
1	utpm016	50.0	90.0	0.0	0	2.0	1.0	2.0	1	0	1	0	0	1	5.0	4.0	5.0	5.0	0.0	4.0	4.0	5.0
1	utpm017	0.0	50.0	0.0	0	2.0	1.0	2.0	0	0	1	0	0	0	2.0	2.0	2.0	2.0	2.0	2.0	3.0	2.0
1	utpm019	0.0	100.0	0.0	0	5.0	2.0	1.0	0	1	1	1	1	1	3.0	4.0	2.0	4.0	4.0	4.0	1.0	4.0
1	utpm021	0.0	45.0	0.0	0	3.0	2.0	0.0	1	0	1	1	1	1	4.0	4.0	4.0	2.0	5.0	1.0	1.0	1.0
1	utpm026	0.0	100.0	0.0	0	5.0	3.0	1.0	0	0	0	1	1	1	3.0	3.0	3.0	3.0	3.0	2.0	2.0	2.0
1	utpm033	10.0	350.0	0.0	0	1.0	1.5	3.0	0	1	1	1	1	1	1.0	3.0	1.0	2.0	5.0	0.0	1.0	1.0
1	utpm040	90.0	100.0	0.0	0	5.0	5.0	5.0	1	1	1	1	1	1	3.0	5.0	5.0	4.0	5.0	2.5	5.0	4.0
1	uepm206	0.0	50.0	0.0	0	5.0	3.0	1.0	1	1	1	0	0	0	2.0	3.0	1.0	2.0	3.0	0.0	0.0	1.0
2	uepm205	0.0	0.0	0.0	0	2.0	1.0	1.0	1	1	1	1	1	1	2.0	2.0	2.0	4.0	4.0	4.0	4.0	3.0
2	uepm204	0.0	0.0	0.0	0	2.0	2.0	3.0	1	1	1	1	1	1	1.5	4.0	5.0	3.0	3.0	2.0	1.0	2.0
2	mcpm304	0.0	20.0	0.0	0	4.0	1.5	4.0	1	0	1	1	1	1	4.0	4.5	2.0	2.0	0.0	0.0	3.0	4.0
1	mcpm401	0.0	0.0	0.0	0	5.0	4.0	1.0	0	0	0	1	0	0	4.0	1.0	5.0	3.0	3.0	1.0	1.0	1.0
1	mcpm070	0.0	0.0	0.0	0	5.0	1.0	3.0	0	1	0	1	1	1	2.0	1.0	1.0	1.0	1.0	1.0	3.0	4.0

16		150.0	940.0	0.0	1	*.*	*.*	*.*	*	*	*	*	*	*	*.*	*.*	*.*	*.*	*.*	*.*	*.*	*.*	Sum
1		9.4	58.8	0.0	0	3.3	2.0	2.0	1	1	1	1	1	1	2.7	2.9	2.8	2.8	2.7	1.6	1.9	2.5	Ave
0		619.6	***.*	0.0	0	2.9	1.4	1.7	0	0	0	0	0	0	1.3	1.9	2.7	1.4	3.3	2.0	2.3	2.1	Var
0		24.9	87.0	0.0	0	1.7	1.2	1.3	1	1	0	0	0	0	1.2	1.4	1.7	1.2	1.8	1.4	1.5	1.5	Sdv
1	mcpm070	0.0	0.0	0.0	0	1.0	1.0	0.0	0	0	0	0	0	0	1.0	1.0	1.0	1.0	0.0	0.0	0.0	1.0	Min
1	utpm040	90.0	350.0	0.0	1	5.0	5.0	5.0	1	1	1	1	1	1	5.0	5.0	5.0	5.0	5.0	4.0	5.0	5.0	Max

Number of Observations: 16

2	mcpm910	25.0	50.0	0.0	0	5.0	5.0	5.0	1	1	1	1	1	1	2.0	1.0	4.0	3.0	3.0	1.0	2.0	5.0
2	mcpm705	2.0	25.0	0.0	0	5.0	4.0	5.0	0	1	1	1	1	1	0.0	1.0	1.0	3.0	3.0	1.0	1.0	3.0
2	mcpm999	50.0	25.0	0.0	0	4.0	1.0	3.0	1	1	1	1	1	1	2.0	2.0	3.0	1.0	3.0	2.0	0.0	2.0
2	utpm006	0.0	100.0	0.0	0	1.0	5.0	2.5	0	0	1	1	1	0	2.0	2.0	2.0	4.0	4.0	4.0	0.0	0.0
2	utpm005	0.0	100.0	0.0	0	1.0	0.0	2.0	0	0	1	1	0	0	2.0	1.0	2.0	2.0	2.0	1.0	2.0	0.0
2	utpm009	0.0	5.0	0.0	0	1.0	1.0	3.0	0	1	1	1	1	0	2.0	1.0	3.5	1.0	1.0	2.0	2.0	1.0
2	utpm014	0.0	100.0	0.0	0	5.0	3.0	2.0	0	0	0	0	0	0	3.0	2.0	1.0	4.0	4.0	3.0	4.0	4.0
2	utpm015	0.0	50.0	0.0	0	1.0	1.0	3.0	1	1	1	1	1	0	3.0	1.0	4.0	2.5	2.5	1.0	5.0	5.0
2	utpm018	0.0	0.0	50.0	0	2.0	1.0	0.0	1	1	1	1	1	1	2.0	2.0	2.0	2.0	3.0	1.0	4.0	1.0
2	utpm023	0.0	40.0	0.0	0	5.0	5.0	1.0	0	1	1	1	1	0	2.0	2.0	4.0	3.5	4.0	0.0	0.0	3.0
2	utpm024	75.0	999.9	0.0	0	3.0	5.0	3.0	0	1	1	1	1	1	5.0	5.0	5.0	2.0	5.0	2.0	2.0	4.0
2	utpm025	100.0	999.9	0.0	0	5.0	4.0	5.0	1	1	1	1	1	1	5.0	5.0	5.0	2.0	5.0	2.0	5.0	1.5
2	utpm027	30.0	20.0	0.0	0	1.0	1.0	2.0	1	1	1	1	1	0	4.0	0.0	4.0	4.0	4.0	2.0	2.0	1.0
2	utpm035	0.0	200.0	0.0	0	1.0	3.0	0.0	0	0	0	0	0	1	2.0	3.0	1.5	2.0	2.0	0.0	1.0	1.0
2	utpm037	0.0	10.0	0.0	0	5.0	3.0	3.0	0	1	1	0	0	1	2.0	3.5	2.0	2.5	2.5	1.0	5.0	2.0
2	utpm039	75.0	50.0	0.0	0	3.0	1.0	1.5	1	1	1	1	1	0	1.0	1.5	1.0	0.0	0.0	1.0	1.0	1.0
2	utpm041	0.0	300.0	0.0	0	2.5	1.5	1.0	1	1	1	1	1	0	2.0	2.0	3.0	1.0	4.0	0.0	0.0	3.5
2	utpm042	0.0	30.0	0.0	0	4.0	3.5	3.5	0	1	1	1	1	1	3.0	2.0	2.0	3.0	4.0	3.0	3.0	2.0
2	uepm210	90.0	10.0	0.0	0	4.0	2.5	0.0	0	1	1	1	1	1	0.0	1.0	3.0	2.0	3.0	2.5	3.0	2.5
2	uepm211	20.0	0.0	0.0	1	2.0	1.0	2.0	0	1	0	0	0	1	3.0	1.5	3.0	3.0	3.0	2.0	3.0	3.0
2	uepm208	0.0	250.0	0.0	0	2.0	1.0	1.0	0	0	1	0	0	1	3.0	2.0	3.0	1.0	4.0	2.0	3.0	3.0
2	uepm202	0.0	100.0	0.0	0	5.0	3.0	4.0	1	1	1	1	1	1	3.0	4.0	4.0	0.0	0.0	0.0	0.0	1.0
2	mcpm903	0.0	17.5	0.0	0	2.0	2.0	2.0	0	1	1	1	1	1	2.0	1.0	2.0	2.0	3.0	1.0	2.0	2.5
2	mcpm902	0.0	0.0	0.0	0	0.0	2.0	2.0	0	0	0	0	0	1	0.0	0.0	3.5	3.5	5.0	1.0	1.0	3.0
2	mcpm901	0.0	200.0	0.0	0	4.0	3.0	4.0	1	1	1	1	1	1	3.5	2.0	3.0	3.0	3.0	5.0	4.0	3.0
2	mcpm402	0.0	0.0	0.0	0	2.0	1.0	2.0	0	0	1	1	1	0	3.0	1.5	1.5	4.0	4.0	0.0	4.0	3.5

IN	CATNUMB	PERCN	PERCI	PERCD	N	MIC	MIC	PUB	M	T	M	D	D	R	ASS	MIC	IBM	SWM	SWM	REM	TKE	PSC	
52		467.0	***.*	50.0	1	*.*	*.*	*.*	*	*	*	*	*	*	*.*	*.*	*.*	*.*	*.*	*.*	*.*	*.*	Sum
2		18.0	142.0	1.9	0	2.9	2.4	2.4	0	1	1	1	1	1	2.4	1.9	2.0	2.3	3.1	1.6	2.3	2.4	Ave
0		***.*	***.*	96.2	0	2.8	2.4	2.1	0	0	0	0	0	0	1.6	1.6	1.4	1.4	1.8	1.6	2.8	1.9	Var
0		31.9	265.4	9.8	0	1.7	1.5	1.5	0	0	0	0	0	0	1.3	1.3	1.2	1.2	1.3	1.3	1.7	1.4	Sdv
2	mcpm402	0.0	0.0	0.0	0	0.0	0.0	0.0	0	0	0	0	0	0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	Min
2	utpm042	100.0	999.9	50.0	1	5.0	5.0	5.0	1	1	1	1	1	1	5.0	5.0	5.0	4.0	5.0	5.0	5.0	5.0	Max

Number of Observations: 26

5	utpm028	0.0	999.9	0.0	0	5.0	5.0	4.0	0	1	1	1	1	1	1.0	1.0	1.0	2.0	4.0	3.0	4.0	5.0	
5	utpm043	0.0	20.0	0.0	0	2.0	4.5	4.0	1	1	1	1	1	1	3.0	2.0	4.0	3.0	3.0	0.0	2.0	0.0	
5	utpm045	0.0	20.0	0.0	0	5.0	4.0	1.0	0	0	0	0	0	1	2.0	2.0	2.5	0.0	0.0	1.0	1.0	1.0	
5	utpm046	0.0	50.0	0.0	0	4.0	2.0	2.0	1	0	1	0	0	1	3.0	2.0	3.0	3.0	3.0	0.0	4.0	1.0	
5	utpm047	7:0	65.0	0.0	0	1.0	3.0	3.0	1	1	1	0	0	1	3.0	1.0	3.0	3.0	3.0	1.0	3.0	4.0	
5	uepm209	0.0	15.0	0.0	0	4.0	3.5	4.0	1	1	1	1	1	1	3.0	1.0	3.0	3.0	3.0	3.0	0.0	4.0	
5	uepm213	0.0	100.0	0.0	0	3.0	1.0	3.0	0	0	0	0	0	1	1.0	1.0	1.0	1.0	1.0	2.0	0.0	3.0	
5	mcpm909	0.0	25.0	0.0	0	3.0	1.0	3.0	0	0	1	0	0	1	2.0	3.0	2.0	4.0	3.0	0.0	0.0	0.0	
5	mcpm207	0.0	100.0	0.0	0	5.0	1.0	3.0	0	0	0	0	0	1	5.0	3.0	2.0	3.0	3.0	0.0	3.0	4.0	
5	mcpm907	0.0	350.0	0.0	0	3.0	4.0	5.0	1	0	1	1	1	0	5.0	4.0	5.0	4.0	4.5	1.0	3.0	4.0	
5	mcpm906	100.0	40.0	0.0	0	1.0	3.0	2.0	1	0	1	0	0	0	2.0	1.0	4.0	4.0	3.0	0.0	0.0	5.0	

0 0

6 7 8 4 4 9

55		107.0	***.*	0.0	0	*.*	*.*	*.*	6	4	8	4	4	9	*.*	*.*	*.*	*.*	*.*	*.*	*.*	*.*	Sum
5		9.7	162.3	0.0	0	3.3	2.9	3.1	1	0	1	0	0	1	2.7	1.9	2.8	2.7	2.8	1.0	1.8	2.8	Ave
0		900.8	***.*	0.0	0	2.2	2.1	1.3	0	0	0	0	0	0	1.8	1.1	1.6	1.6	1.6	1.4	2.8	3.8	Var
0		30.0	293.7	0.0	0	1.5	1.5	1.1	1	1	0	1	1	0	1.3	1.0	1.3	1.3	1.3	1.2	1.7	1.9	Sdv
5	mcpm906	0.0	15.0	0.0	0	1.0	1.0	1.0	0	0	0	0	0	0	1.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	Min
5	utpm047	100.0	999.9	0.0	0	5.0	5.0	5.0	1	1	1	1	1	1	5.0	4.0	5.0	4.0	4.5	3.0	4.0	5.0	Max

Number of Observations: 11

8	utpm001	0.0	30.0	0.0	0	3.5	2.0	2.0	0	1	1	1	1	1	5.0	2.0	5.0	3.5	3.5	1.0	1.0	3.0	
8	utpm007	10.0	200.0	0.0	0	3.0	3.0	3.0	1	1	1	1	1	1	3.0	2.0	3.0	2.0	4.0	1.0	4.0	3.0	
8	utpm008	50.0	10.0	0.0	0	4.0	2.0	2.0	1	0	0	0	0	0	2.0	2.0	3.0	3.0	2.0	0.0	2.0	4.0	
8	utpm010	100.0	50.0	0.0	0	5.0	1.0	1.0	0	1	1	1	1	1	5.0	5.0	3.0	0.0	3.5	0.0	2.0	0.0	
8	utpm011	0.0	0.0	0.0	1	1.0	3.0	4.5	1	1	0	1	1	0	2.0	0.0	2.0	2.0	2.0	2.0	2.0	2.0	
8	utpm013	0.0	0.0	0.0	1	5.0	1.0	5.0	1	1	0	0	0	1	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
8	utpm020	63.0	0.0	0.0	0	2.0	1.0	3.0	0	1	1	1	1	1	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
8	utpm022	0.0	0.0	0.0	0	1.0	0.0	2.0	1	1	1	1	0	0	3.0	1.0	3.0	4.0	4.0	0.0	0.0	1.0	
8	utpm032	0.0	50.0	0.0	0	1.0	1.0	1.0	1	1	1	1	1	0	1.0	1.0	1.0	3.0	3.0	0.0	0.0	1.0	
8	utpm031	0.0	70.0	3.0	0	3.0	3.0	3.0	0	1	1	1	1	0	2.5	0.0	3.0	2.5	2.5	0.0	2.0	0.0	
8	utpm035	0.0	30.0	0.0	0	2.0	2.5	2.0	0	1	1	0	0	1	2.5	1.0	3.0	4.0	4.0	3.5	3.0	2.0	
8	utpm038	0.0	25.0	0.0	0	5.0	3.0	3.0	1	0	0	0	0	1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
8	utpm048	0.0	0.0	0.0	0	1.0	5.0	3.0	1	0	0	0	0	0	0.0	1.0	2.5	2.0	1.0	3.0	0.0	3.0	
8	uepm212	0.0	300.0	0.0	0	2.0	2.0	4.0	1	1	1	1	1	1	1.0	3.0	2.0	4.0	4.0	1.0	1.0	4.0	
8	uepm203	0.0	20.0	0.0	0	2.0	2.0	3.0	0	1	1	1	0	0	4.0	4.0	2.0	4.0	5.0	3.0	4.0	4.0	
8	uepm201	0.0	50.0	0.0	0	1.0	1.0	1.0	0	0	0	1	0	0	3.0	0.0	4.0	0.0	0.0	0.0	0.0	0.0	
8	mcpm905	0.0	200.0	0.0	0	3.0	2.0	4.0	0	1	1	0	1	0	4.0	4.0	2.0	3.0	3.0	2.0	2.0	2.0	
8	mcpm403	0.0	0.0	0.0	0	2.5	2.0	2.0	0	0	0	0	0	1	2.0	1.0	2.0	4.5	4.5	4.0	0.0	4.5	

9 13 11 11 10 9

**		223.0	***.*	3.0	2	*.*	*.*	*.*	9	*	*	*	*	9	*.*	*.*	*.*	*.*	*.*	*.*	*.*	*.*	Sum
8		12.4	57.5	0.2	0	2.6	2.0	2.7	1	1	1	1	1	1	2.8	2.1	2.8	2.9	3.1	1.7	1.8	2.4	Ave

IN	CATNUMB	PERCN	PERCI	PERCD	N	MIC	MIC	PUB	M	T	M	D	D	R	ASS	MIC	IBM	SWM	SWM	REM	TKE	PSC	
0		812.1	***.*	0.5	0	2.0	1.3	1.4	0	0	0	0	0	0	1.9	2.5	1.0	1.8	1.7	2.4	2.3	2.4	Var
0		28.5	86.0	0.7	0	1.4	1.1	1.2	1	0	1	1	1	1	1.4	1.6	1.0	1.3	1.3	1.6	1.5	1.5	Sdv
8	mcpm403	0.0	0.0	0.0	0	1.0	0.0	1.0	0	0	0	0	0	0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	Min
8	utpm048	100.0	300.0	3.0	1	5.0	5.0	5.0	1	1	1	1	1	1	5.0	5.0	5.0	4.5	5.0	4.0	4.0	4.5	Max

Number of Observations: 18

11	mcpm704	0.0	100.0	0.0	0	1.0	1.0	2.0	1	1	0	0	0	1	4.0	0.0	3.0	3.0	3.0	0.0	0.0	0.0	
11	utpm030	0.0	50.0	0.0	0	1.0	3.0	2.0	0	1	1	0	0	1	3.0	2.0	4.0	2.0	3.0	0.0	3.0	3.0	
11	utpm034	100.0	0.0	0.0	0	3.0	4.0	3.5	1	1	1	1	1	1	4.0	3.5	4.0	1.0	1.0	2.0	2.0	2.5	
11	utpm049	0.0	100.0	0.0	0	5.0	2.0	5.0	1	1	1	0	0	1	3.0	2.0	3.0	3.0	4.0	2.0	4.0	0.0	
11	utpm044	10.0	50.0	0.0	0	3.0	1.0	3.0	0	1	1	0	0	0	2.0	2.0	3.0	4.0	4.0	2.0	1.0	3.0	
11	mcpm908	50.0	100.0	0.0	0	2.0	1.0	2.0	1	1	1	1	1	1	3.0	1.0	4.0	3.0	4.0	1.0	1.0	2.0	
11	mcpm404	20.0	0.0	0.0	0	5.0	1.0	1.0	0	0	0	0	0	0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
77		180.0	400.0	0.0	0	*.*	*.*	*.*	4	6	5	2	2	5	*.*	*.*	*.*	*.*	*.*	7.0	*.*	*.*	Sum
11		25.7	57.1	0.0	0	2.9	1.9	2.6	1	1	1	0	0	1	3.1	1.5	3.0	2.3	2.7	1.0	1.6	1.5	Ave
0		***.*	***.*	0.0	0	2.8	1.5	1.7	0	0	0	0	0	0	0.5	1.6	2.0	1.9	2.6	1.0	2.3	2.1	Var
0		37.4	45.0	0.0	0	1.7	1.2	1.3	1	0	0	0	0	0	0.7	1.3	1.4	1.4	1.6	1.0	1.5	1.4	Sdv
11	mcpm404	0.0	0.0	0.0	0	1.0	1.0	1.0	0	0	0	0	0	0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Min
11	utpm049	100.0	100.0	0.0	0	5.0	4.0	5.0	1	1	1	1	1	1	4.0	3.5	4.0	4.0	4.0	2.0	4.0	3.0	Max

Number of Observations: 7

**		***.*	***.*	53.0	4	*.*	*.*	*.*	*	*	*	*	*	*	*.*	*.*	*.*	*.*	*.*	*.*	*.*	*.*	Sum
4		14.4	100.7	0.7	0	3.0	2.3	2.5	1	1	1	1	1	1	2.7	2.1	2.8	2.6	2.9	1.5	2.0	2.4	Ave
11		880.7	***.*	32.1	0	2.5	1.9	1.8	0	0	0	0	0	0	1.5	1.9	1.6	1.5	2.0	1.8	2.4	2.3	Var
3		29.7	198.6	5.7	0	1.6	1.4	1.3	1	0	0	0	0	0	1.2	1.4	1.3	1.2	1.4	1.3	1.6	1.5	Sdv
1	mcpm070	0.0	0.0	0.0	0	0.0	0.0	0.0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Min
11	utpm049	100.0	999.9	50.0	1	5.0	5.0	5.0	1	1	1	1	1	1	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	Max

Number of Observations: 78

1	utpm033	4.0	1	2.0	3	5.0	1.0	3.0	5.0	5.0	5.0	1	1	3500	7000				

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IN	CATNUMB	6 IHF FUT	7A M	8 PCAG	9 M	10 MOD	10 EXIT	10 NEW	11A DBL	11B ANA	11C PRO	12A B	14A E m	14B USERN	14B USERF	14C MESSNOW	14C MESSFUT	
1	utpm002	2.0	1	2.0	2	4.0	2.0	5.0	5.0	5.0	5.0	1	0	0	0	0.00000	0.00000	
1	utpm003	1.0	1	-4.0	1	5.0	1.0	1.0	1.0	1.0	1.0	0	0	0	0	0.00000	0.00000	
1	utpm004	1.0	1	3.0	3	5.0	1.0	4.0	4.0	4.0	4.0	1	1	150	400	2000.00000	10000.00000	
1	utpm016	1.0	1	3.0	1	4.0	2.0	3.0	5.0	5.0	5.0	0	1	6	35	0.00000	0.00000	
1	utpm017	2.0	1	3.0	3	4.0	3.0	2.0	5.0	2.0	5.0	0	0	0	0	0.00000	0.00000	
1	utpm019	3.0	1	4.0	1	3.0	2.0	3.0	5.0	5.0	5.0	1	1	10	50	0.00000	0.00000	
1	utpm021	5.0	1	4.0	3	2.0	1.0	1.0	3.0	3.0	2.0	0	0	0	0	0.00000	0.00000	
1	utpm026	3.0	1	5.0	2	5.0	5.0	2.0	5.0	5.0	5.0	0	0	0	0	0.00000	0.00000	
1	utpm033	4.0	1	2.0	3	5.0	1.0	3.0	5.0	5.0	5.0	1	1	3500	7000	30000.00000	30000.00000	
1	utpm040	5.0	1	5.0	1	1.0	1.0	3.0	1.0	1.0	1.0	1	1	400	2500	0.00000	0.00000	
1	uepm206	1.0	1	1.0	1	4.0	2.0	1.0	4.0	4.0	4.0	1	0	0	0	0.00000	0.00000	
1	uepm205	1.0	1	1.0	1	3.0	4.0	4.0	1.0	1.0	1.0	0	1	35	70	900.00000	1800.00000	
1	uepm204	1.5	0	2.0	3	1.5	1.0	4.0	5.0	5.0	3.0	0	0	0	0	0.00000	0.00000	
1	mcpm904	5.0	1	-2.0	2	4.0	3.0	1.0	5.0	4.0	1.5	1	0	0	500	0.00000	0.00000	
1	mcpm401	5.0	1	5.0	2	2.0	1.0	4.0	4.0	4.0	5.0	0	0	0	0	0.00000	0.00000	
1	mcpm070	5.0	0	3.0	3	4.0	1.0	3.0	0.0	0.0	0.0	0	0	0	0	0.00000	0.00000	
16				*.**	*	37.0	*	*.**	*.**	*.**	*.**	*.**	7	6	4101	10555	32900.00000	41800.00000	Sum
1		2.8	1	2.3	2	3.5	1.9	2.8	3.6	3.4	3.3	0	0	256	660	2056.25000	2612.50000	Ave
0		3.0	0	6.1	1	1.7	1.5	1.7	3.3	3.2	3.5	0	0	*****	*****	55810625.00000	59602500.00000	Var
0		1.7	0	2.5	1	1.3	1.2	1.3	1.8	1.8	1.9	1	1	871	1802	7470.65091	7720.26554	Sdv
1	mcpm070	1.0	0	-4.0	1	1.0	1.0	1.0	0.0	0.0	0.0	0	0	0	0	0.00000	0.00000	Min
1	utpm040	5.0	1	5.0	3	5.0	5.0	5.0	5.0	5.0	5.0	1	1	3500	7000	30000.00000	30000.00000	Max

Number of Observations: 16

2	mcpm910	5.0	1	2.0	1	2.0	2.0	4.0	2.0	2.0	4.0	0	1	75	500	3750.00000	15000.00000	
2	mcpm705	2.0	1	5.0	3	4.0	4.0	4.0	4.0	3.0	2.0	0	1	75	225	7500.00000	22500.00000	
2	mcpm999	1.0	1	-3.0	2	1.0	4.0	1.0	3.0	1.0	3.0	1	1	0	400	0.00000	0.00000	
2	utpm006	1.0	1	-2.5	3	5.0	1.0	1.0	1.0	1.0	1.0	0	0	0	0	0.00000	0.00000	
2	utpm005	1.0	1	2.0	1	5.0	3.0	5.0	5.0	5.0	3.0	1	1	15	500	0.00000	0.00000	
2	utpm009	2.0	1	-2.0	2	4.0	2.0	3.0	2.0	3.0	2.0	0	0	0	0	0.00000	0.00000	
2	utpm014	3.0	1	3.0	3	4.0	1.0	3.0	0.0	0.0	0.0	1	0	0	0	0.00000	0.00000	
2	utpm015	3.0	1	3.0	2	1.5	4.0	3.0	4.5	4.5	2.5	1	0	0	0	0.00000	0.00000	
2	utpm018	4.0	1	3.0	3	0.0	1.5	1.5	1.0	1.0	1.0	0	1	130	400	0.00000	0.00000	
2	utpm023	3.0	1	2.0	1	5.0	3.0	3.0	2.0	2.0	2.0	1	0	0	0	0.00000	0.00000	
2	utpm024	5.0	1	0.0	1	3.0	2.0	3.0	2.0	2.0	2.0	0	1	100	750	0.00000	0.00000	
2	utpm025	1.0	0	5.0	3	4.5	4.5	4.5	1.1	0.0	1.0	1	1	25	1000	100.00000	100000.00000	
2	utpm027	2.0	1	3.0	1	4.0	4.0	1.0	5.0	5.0	5.0	0	1	400	2500	8000.00000	100000.00000	
2	utpm035	3.0	1	-3.0	1	5.0	3.0	1.0	2.0	1.0	3.0	1	0	0	0	0.00000	0.00000	
2	utpm037	4.0	1	-3.0	1	2.0	5.0	3.0	5.0	5.0	5.0	1	0	0	0	0.00000	0.00000	
2	utpm039	4.0	1	2.0	3	5.0	5.0	4.0	4.0	5.0	5.0	1	1	1000	3000	5000.00000	25000.00000	
2	utpm041	4.0	0	2.0	1	5.0	1.0	3.0	1.0	1.0	1.0	1	0	0	0	0.00000	0.00000	
2	utpm042	3.0	1	4.0	1	2.0	5.0	3.0	3.0	4.0	5.0	1	1	2000	5000	0.00000	0.00000	
2	uepm210	4.0	1	1.0	2	5.0	2.0	3.0	3.0	3.0	5.0	0	1	13	65	20.00000	800.00000	
2	uepm211	2.0	1	0.0	3	3.0	4.0	5.0	3.0	3.0	4.0	0	1	0	0	0.00000	0.00000	
2	uepm208	3.0	1	4.5	1	1.0	2.0	3.0	4.0	1.0	1.0	1	1	0	0	0.00000	0.00000	
2	uepm202	2.0	1	3.0	3	3.0	3.0	2.0	5.0	5.0	5.0	0	0	0	0	0.00000	0.00000	
2	mcpm903	3.0	1	-2.0	2	5.0	4.0	3.0	3.5	3.5	4.5	0	0	0	0	0.00000	0.00000	
2	mcpm902	1.0	0	2.0	2	0.0	2.0	3.0	4.0	3.0	3.0	1	0	0	0	0.00000	0.00000	
2	mcpm901	4.0	1	3.0	1	1.0	1.0	3.0	5.0	4.0	5.0	1	1	200	450	0.00000	0.00000	
2	mcpm402	0.5	0	2.0	2	2.5	2.0	2.0	3.0	4.0	4.0	0	0	0	0	0.00000	0.00000	

IN	CATNUMB	IHF	M	PCAG	M	MOD	EXI	NEW	DBL	ANA	PRO	B	E	USERN	USERF	MESSNOW	MESSFUT	
52		*.*	*	36.0	*	*.*	*.*	*.*	*.*	*.*	*.*	*	*	4033	14790	24370.00000	263300.00000	Sum
2		2.7	1	1.4	2	3.2	2.9	2.9	3.0	2.8	3.0	1	1	155	569	937.30769	10126.92308	Ave
0		1.7	0	6.4	1	2.9	1.8	1.3	2.2	2.8	2.7	0	0	*****	*****	5459228.46154	747618846.15384	Var
0		1.3	0	2.5	1	1.7	1.3	1.2	1.5	1.7	1.6	1	1	430	1174	2336.49919	27342.61959	Sdv
2	mcpm402	0.5	0	-3.0	1	0.0	1.0	1.0	0.0	0.0	0.0	0	0	0	0	0.00000	0.00000	Min
2	utpm042	5.0	1	5.0	3	5.0	5.0	5.0	5.0	5.0	5.0	1	1	2000	5000	8000.00000	100000.00000	Max

Number of Observations: 26

5	utpm028	4.0	1	5.0	1	5.0	3.0	1.0	4.0	4.0	4.0	0	0	0	0	0.00000	0.00000	
5	utpm043	5.0	1	3.0	3	1.0	1.0	1.0	5.0	5.0	5.0	1	0	0	0	0.00000	0.00000	
5	utpm045	4.5	1	0.0	2	5.0	1.0	3.0	5.0	5.0	0.0	1	0	0	0	0.00000	0.00000	
5	utpm046	2.0	1	3.0	1	3.0	3.0	1.0	5.0	5.0	5.0	1	0	0	0	0.00000	0.00000	
5	utpm047	4.0	1	3.5	3	5.0	2.0	2.0	5.0	5.0	5.0	0	1	650	2100	130000.00000	130000.00000	
5	uepm209	3.0	1	1.5	2	1.0	3.0	2.0	3.0	2.0	1.0	1	0	0	0	0.00000	0.00000	
5	uepm213	2.0	1	4.0	1	5.0	5.0	5.0	4.0	4.0	4.0	0	0	0	0	0.00000	0.00000	
5	mcpm909	5.0	1	-5.0	3	3.0	3.0	1.0	3.0	3.0	0.0	1	0	0	0	0.00000	0.00000	
5	uepm207	4.0	1	3.0	2	1.0	3.0	5.0	5.0	5.0	5.0	1	1	32	100	0.00000	0.00000	
5	mcpm907	4.0	0	5.0	3	1.0	0.0	2.0	0.0	0.0	0.0	1	0	0	0	0.00000	0.00000	
5	mcpm906	2.0	1	-1.0	2	1.0	2.0	5.0	5.0	1.0	5.0	1	0	0	50	0.00000	0.00000	
55		*.*	*	22.0	*	*.*	*.*	*.*	*.*	*.*	*.*	8	2	682	2250	130000.00000	130000.00000	Sum
5		3.6	1	2.0	2	2.8	2.4	2.5	4.0	3.5	3.1	1	0	62	205	11818.18182	11818.18182	Ave
0		1.3	0	9.0	1	3.6	1.9	2.9	2.4	3.3	5.3	0	0	38124	*****	*********.*****	*********.*****	Var
0		1.2	0	3.0	1	1.9	1.4	1.7	1.5	1.8	2.3	0	0	195	629	39196.47480	39196.47480	Sdv
5	mcpm906	2.0	0	-5.0	1	1.0	0.0	1.0	0.0	0.0	0.0	0	0	0	0	0.00000	0.00000	Min
5	utpm047	5.0	1	5.0	3	5.0	5.0	5.0	5.0	5.0	5.0	1	1	650	2100	130000.00000	130000.00000	Max

Number of Observations: 11

8	utpm001	1.0	1	3.0	1	2.0	4.0	2.0	5.0	5.0	3.0	1	0	0	0	0.00000	0.00000	
8	utpm007	3.0	1	2.0	1	1.0	3.0	1.0	5.0	5.0	5.0	1	1	30	4000	6000.00000	2400000.00000	
8	utpm008	2.0	1	2.0	3	3.0	1.0	2.0	2.0	3.0	2.0	1	1	100	200	0.00000	0.00000	
8	utpm010	5.0	1	4.0	1	2.0	3.0	3.0	4.0	1.0	1.0	1	1	27000	27000	0.00000	0.00000	
8	utpm011	3.0	1	-2.0	3	4.5	2.0	1.0	2.0	1.0	2.0	0	1	6500	6500	550000.00000	550000.00000	
8	utpm013	1.0	0	-3.0	3	5.0	5.0	5.0	1.0	1.0	1.0	1	1	150	1000	0.00000	0.00000	
8	utpm020	2.0	1	3.0	3	2.0	2.0	2.0	0.0	0.0	0.0	0	1	200	450	0.00000	0.00000	
8	utpm022	1.0	1	3.0	0	5.0	1.0	1.0	0.0	0.0	0.0	0	1	1000	2500	0.00000	0.00000	
8	utpm032	3.0	1	4.0	2	2.0	2.0	2.0	5.0	3.0	5.0	0	0	0	0	0.00000	0.00000	
8	utpm031	5.0	1	1.0	3	5.0	5.0	1.0	5.0	3.0	3.0	1	0	0	0	0.00000	0.00000	
8	utpm036	3.0	1	3.0	3	4.0	5.0	4.0	3.0	3.0	3.0	1	0	0	0	0.00000	0.00000	
8	utpm038	3.0	1	5.0	1	5.0	2.0	1.0	3.0	5.0	5.0	1	0	0	0	0.00000	0.00000	
8	utpm048	4.0	1	-2.5	2	-4.0	2.0	4.0	1.5	1.5	0.0	0	0	0	0	0.00000	0.00000	
8	uepm212	3.0	1	3.0	3	2.0	1.0	2.0	5.0	3.0	5.0	0	1	2500	6500	19800.00000	49500.00000	
8	uepm203	2.0	0	2.0	1	5.0	1.0	1.0	3.0	2.0	5.0	0	0	0	0	0.00000	0.00000	
8	uepm201	2.0	0	2.0	3	5.0	1.0	4.0	5.0	5.0	5.0	1	0	0	0	0.00000	0.00000	
8	mcpm905	2.0	0	-3.0	2	-4.0	2.0	2.0	5.0	4.0	2.0	1	0	0	0	0.00000	0.00000	
8	mcpm403	2.0	1	-3.0	1	4.0	4.0	4.0	5.0	5.0	5.0	0	0	0	0	0.00000	0.00000	
88		*.*	*	23.5	*	*.*	*.*	*.*	*.*	*.*	*.*	*	8	37480	48150	575000.00000	2999500.00000	Sum
8		2.6	1	1.3	2	3.6	2.6	2.3	3.3	2.8	2.9	1	0	2082	2675	31988.86889	166638.86889	Ave

IN	CATNUMB	IHF	M	PCAG	M	MOD	EXI	NEW	DBL	ANA	PRO	B	E	USERN	USERF	MESSNOW	MESSFUT	
0		1.4	0	7.4	1	1.9	2.1	1.8	3.4	3.2	3.9	0	0	*****	*****	**********.*****	**********.*****	Var
0		1.2	0	2.7	1	1.4	1.5	1.3	1.8	1.8	2.0	1	1	6419	6454	129366.97410	572153.66626	Sdv
8	mcpm403	1.0	0	-3.0	0	1.0	1.0	1.0	0.0	0.0	0.0	0	0	0	0	0.00000	0.00000	Min
8	utpm048	5.0	1	5.0	3	5.0	5.0	5.0	5.0	5.0	5.0	1	1	27000	27000	550000.00000	2400000.00000	Max

Number of Observations: 18

11	mcpm704	3.0	1	0.0	2	4.0	3.0	2.0	3.0	2.0	5.0	1	0	0	0	0.00000	0.00000	
11	utpm030	3.0	1	3.0	3	5.0	2.0	2.0	4.0	4.0	5.0	0	1	200	200	0.00000	0.00000	
11	utpm034	2.0	1	2.0	2	3.0	3.0	5.0	3.0	2.0	4.0	1	1	350	550	100000.00000	100000.00000	
11	utpm049	5.0	1	1.0	3	2.0	4.0	3.0	5.0	4.0	5.0	0	0	0	0	0.00000	0.00000	
11	utpm044	4.5	1	-2.0	1	1.0	1.0	5.0	4.0	2.0	3.0	1	1	200	1200	0.00000	0.00000	
11	mcpm908	4.0	1	5.0	3	5.0	1.0	4.0	5.0	3.0	1.0	0	1	400	2000	10000.00000	100000.00000	
11	mcpm404	1.0	1	2.0	1	4.0	1.0	4.0	0.0	0.0	0.0	1	1	1000	2000	60000.00000	120000.00000	
77		*.*	7	11.0	*	*.*	*.*	*.*	*.*	*.*	*.*	4	5	2150	5950	170000.00000	320000.00000	Sum
11		3.2	1	1.6	2	3.4	2.1	3.6	3.4	2.4	3.3	1	1	307	850	24285.71429	45714.28571	Ave
0		2.0	0	5.0	1	2.3	1.5	1.6	3.0	2.0	4.2	0	0	*****	*****	**********.*****	**********.*****	Var
0		1.4	0	2.2	1	1.5	1.2	1.3	1.7	1.4	2.1	1	0	342	887	33940.43184	57404.16444	Sdv
11	mcpm404	1.0	1	-2.0	1	1.0	1.0	2.0	0.0	0.0	0.0	0	0	0	0	0.00000	0.00000	Min
11	utpm049	5.0	1	5.0	3	5.0	4.0	5.0	5.0	4.0	5.0	1	1	1000	2000	100000.00000	120000.00000	Max

Number of Observations:

**		*.*	*	**.*	*	*.*	*.*	*.*	*.*	*.*	*.*	*	*	48446	81695	933070.00000	3754500.00000	Sum
4		2.9	1	1.7	2	3.3	2.5	2.7	3.4	3.0	3.1	1	0	621	1047	11962.43590	48135.89744	Ave
11		1.9	0	6.6	1	2.4	1.8	1.8	2.8	2.9	3.4	0	0	*****	*****	**********.*****	**********.*****	Var
3		1.4	0	2.6	1	1.6	1.4	1.3	1.7	1.7	1.9	0	1	3158	3350	64810.45118	278163.72222	Sdv
1	mcpm070	0.5	0	-5.0	0	0.0	0.0	1.0	0.0	0.0	0.0	0	0	0	0	0.00000	0.00000	Min
11	utpm049	5.0	1	5.0	3	5.0	5.0	5.0	5.0	5.0	5.0	1	1	27000	27000	550000.00000	2400000.00000	Max

Number of Observations: 78

IN	CATNUMB	PCNO	1984 PC19	1985 PC19	NOW XT370	84 XT370	85 XT370	NOW IBMPC	1984 IBMPC	1985 IBMPC	UNNOW	1984 UN19	1985 UN19	OTHER	OTHER	OTHER
1	utpm002	50	125	225	2	15	45	48	110	180	0	0	0	0	0	0
1	utpm003	100	200	300	0	0	0	50	100	150	0	0	0	50	100	150
1	utpm004	10	20	30	0	1	2	9	16	23	0	2	4	1	1	1
1	utpm016	25	60	100	0	2	2	18	18	18	0	0	0	7	7	7
1	utpm017	6	20	40	0	0	6	0	0	0	0	0	0	6	6	6
1	utpm019	100	250	400	0	0	0	100	100	100	0	0	0	0	0	0
1	utpm021	4	12	24	0	0	0	0	0	0	0	0	0	4	4	4
1	utpm026	10	20	40	0	0	0	7	7	7	0	0	0	3	3	3
1	utpm033	75	225	675	0	0	0	30	74	223	0	0	0	45	151	452
1	utpm040	130	200	400	0	0	0	90	140	280	0	0	0	40	60	120
1	uepm206	22	45	70	12	25	25	5	10	10	0	0	1	5	10	10
1	uepm205	60	80	100	20	30	40	10	10	10	0	0	0	30	40	50
1	uepm204	300	600	1200	150	399	893	100	200	300	0	1	1	50	50	50
1	mcpm904	60	130	350	0	0	5	10	0	0	0	0	0	60	0	0
1	mcpm401	216	300	300	0	0	0	10	85	85	0	0	0	206	206	206
1	mcpm070	50	80	140	28	56	56	20	24	24	0	0	0	2	2	2
16		1218	2367	4394	212	528	1080	507	894	1410	0	3	6	509	640	1061	Sum
1		76	148	275	13	33	68	32	56	88	0	0	0	32	40	66	Ave
0		6668	****	****	1402	9778	****	1261	3724	****	0	0	1	2634	3837	****	Var
0		82	152	307	37	99	223	36	61	106	0	1	1	51	62	121	Sdv
1	mcpm070	4	12	24	0	0	0	0	0	0	0	0	0	0	0	0	Min
1	utpm040	300	600	1200	150	399	893	100	200	300	0	2	4	206	206	452	Max

Number of Observations: 16

2	mcpm910	220	350	600	20	100	200	190	250	400	0	0	0	10	10	10
2	mcpm705	20	30	50	20	30	50	0	0	0	0	0	0	0	0	0
2	mcpm999	150	300	500	0	10	40	75	150	300	0	0	0	75	140	160
2	utpm006	10	16	16	5	9	9	0	0	0	0	0	0	5	7	7
2	utpm005	5	30	30	0	15	15	4	14	14	0	0	0	1	1	1
2	utpm009	5	10	20	0	1	4	4	8	15	0	0	0	1	1	1
2	utpm014	100	200	350	0	0	40	100	100	100	0	0	0	0	0	0
2	utpm015	75	150	150	0	0	0	55	55	55	0	0	0	25	25	25
2	utpm018	50	120	240	0	0	0	0	0	0	0	0	0	0	0	0
2	utpm023	13	20	20	0	0	0	13	13	13	0	0	0	0	0	0
2	utpm024	200	400	800	0	0	0	150	150	150	1	1	1	49	49	49
2	utpm025	100	163	163	0	2	2	50	100	100	0	0	0	50	50	50
2	utpm027	100	150	150	0	0	0	80	80	80	0	0	0	20	20	20
2	utpm035	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	utpm037	15	100	100	0	0	0	9	60	60	0	0	0	6	40	0
2	utpm039	250	1000	1000	0	0	0	140	140	140	0	0	0	100	100	100
2	utpm041	47	77	77	0	20	20	35	40	40	0	0	0	12	17	17
2	utpm042	350	450	450	0	4	4	210	360	360	0	0	0	140	90	90
2	uepm210	52	99	175	0	20	40	20	41	100	2	4	5	30	35	30
2	uepm211	125	135	160	2	5	10	100	120	140	0	2	5	20	8	5
2	uepm208	14	30	100	10	21	71	4	9	29	0	0	0	0	0	0
2	uepm202	150	300	600	5	10	20	145	290	580	0	0	0	0	0	0
2	mcpm903	125	225	450	10	50	100	50	90	90	0	0	0	65	85	85
2	mcpm902	4	4	4	0	0	0	1	1	1	0	0	0	3	3	3
2	mcpm901	300	400	500	0	4	4	200	200	200	0	0	0	100	100	100
2	mcpm402	30	60	75	0	0	0	5	5	5	5	12	12	20	20	20

IN	CATNUMB	PCNO	PC19	PC19	XT37	XT37	XT37	IBMP	IBMP	IBMP	UNKO	UN19	UN19	OTHE	OTHE	OTHE	
52		2510	4819	6780	72	301	629	1640	2276	2972	8	19	23	732	801	773	Sum
2		97	185	261	3	12	24	63	88	114	0	1	1	28	31	30	Ave
0		9697	****	****	34	469	1935	4875	9636	****	1	6	7	1471	1596	1826	Var
0		98	215	271	6	22	44	70	98	146	1	2	3	38	40	43	Sdv
2	mcpm402	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Min
2	utpm042	350	1000	1000	20	100	200	210	360	580	5	12	12	140	140	160	Max

Number of Observations: 26

5	utpm028	50	100	125	0	0	0	49	49	49	1	1	1	0	0	0	
5	utpm043	160	300	350	0	0	0	150	270	270	0	0	0	10	30	30	
5	utpm045	33	100	250	0	0	0	33	100	100	0	0	0	0	0	0	
5	utpm046	200	325	325	0	0	0	195	319	319	0	0	0	5	7	7	
5	utpm047	220	400	450	0	0	0	214	392	441	1	1	1	5	8	9	
5	uepm209	10	20	50	0	1	2	2	5	10	0	0	2	8	14	36	
5	uepm213	5	7	20	2	2	2	3	5	18	0	0	0	0	0	0	
5	mcpm909	350	525	525	20	20	20	250	250	250	0	0	0	80	80	80	
5	uepm207	372	750	1000	308	616	825	0	0	0	0	0	0	64	134	175	
5	mcpm907	20	25	25	0	0	0	17	0	0	0	0	0	3	3	3	
5	mcpm906	4	10	10	4	5	5	0	0	0	0	0	0	0	5	5	

55		1424	2562	3130	334	644	854	913	1390	1457	2	2	4	175	281	345	Sum
5		129	233	285	30	59	78	83	126	132	0	0	0	16	26	31	Ave
0		****	****	****	8514	****	****	9683	****	****	0	0	0	793	1842	2856	Var
0		140	249	300	92	185	248	98	151	159	0	0	1	28	43	53	Sdv
5	mcpm906	4	7	10	0	0	0	0	0	0	0	0	0	0	0	0	Min
5	utpm047	372	750	1000	308	616	825	250	392	441	1	1	2	80	134	175	Max

Number of Observations: 11

8	utpm001	140	250	325	25	35	90	100	175	225	0	0	0	15	15	20	
8	utpm007	7	30	30	0	20	20	3	5	5	0	0	0	4	5	5	
8	utpm008	25	40	85	0	2	23	21	34	71	0	0	0	4	4	4	
8	utpm010	1800	3600	5400	0	0	0	1764	3528	5292	0	0	0	36	36	36	
8	utpm011	20	250	500	0	0	0	20	20	20	0	0	0	0	0	0	
8	utpm013	400	800	1200	0	0	0	100	100	100	10	10	10	290	290	290	
8	utpm020	600	900	900	0	0	0	400	600	600	0	0	0	200	300	300	
8	utpm022	200	300	400	0	50	100	160	185	210	0	0	0	40	65	90	
8	utpm032	5	10	20	0	0	0	5	5	5	0	0	0	0	0	0	
8	utpm031	20	50	50	0	9	9	20	20	20	0	0	0	0	0	0	
8	utpm036	30	50	87	0	2	2	24	38	68	0	0	0	6	10	18	
8	utpm038	100	120	175	5	6	6	75	75	75	0	0	0	20	20	20	
8	utpm048	27	55	140	0	0	5	22	45	100	0	0	0	5	10	35	
8	uepm212	850	2400	5000	1	1	1	594	1679	2499	2	2	2	254	718	1498	
8	uepm203	15	30	50	5	30	50	10	10	10	0	0	0	0	0	0	
8	uepm201	25	100	200	25	100	200	0	0	0	0	0	0	0	0	0	
8	mcpm905	0	1000	3000	0	0	0	150	150	150	0	0	0	0	0	0	
8	mcpm403	22	100	100	2	2	2	9	9	9	0	0	0	11	11	11	

**		4286	****	****	63	257	508	3477	6678	9459	12	12	12	885	1484	2327	Sum
8		238	560	981	4	14	28	193	371	526	1	1	1	49	82	129	Ave

IN	CATNUMB	PCNO	PC19	PC19	XT37	XT37	XT37	IBMP	IBMP	IBMP	UNNO	UN19	UN19	OTHE	OTHE	OTHE	
0		****	****	****	64	676	2785	****	****	****	6	6	6	8755	****	****	Var
0		456	963	1693	8	26	53	422	883	1324	2	2	2	94	184	354	Sdv
8	mcpm403	0	10	20	0	0	0	0	0	0	0	0	0	0	0	0	Min
8	utpm048	1800	3600	5400	25	100	200	1764	3528	5292	10	10	10	290	718	1498	Max

Number of Observations: 18

11	mcpm704	250	400	550	0	20	150	250	380	50	0	10	250	50	50	50	
11	utpm030	250	375	565	0	0	0	210	210	210	0	0	0	40	40	40	
11	utpm034	207	440	880	1	0	0	207	440	880	0	0	0	0	0	0	
11	utpm049	50	1275	1925	0	150	200	43	55	75	0	0	0	7	70	150	
11	utpm044	150	300	600	0	36	36	140	250	250	0	0	0	10	15	15	
11	mcpm908	100	600	1000	0	15	15	80	485	485	0	0	0	20	100	100	
11	mcpm404	30	50	70	0	1	1	28	20	20	0	0	0	2	2	2	
77		1037	3440	5590	1	222	402	958	1840	1970	0	10	250	129	277	357	Sum
11		148	491	799	0	32	57	137	263	281	0	1	36	18	40	51	Ave
0		8354	****	****	0	2897	6823	7829	****	****	0	14	8929	379	1378	3104	Var
0		91	383	578	0	54	83	88	182	308	0	4	94	19	37	56	Sdv
11	mcpm404	30	50	70	0	0	0	28	20	20	0	0	0	0	0	0	Min
11	utpm049	250	1275	1925	1	150	200	250	485	880	0	10	250	50	100	150	Max

Number of Observations: 7

**		****	****	****	682	1952	3473	7495	****	****	22	46	295	2430	3483	4863	Sum
4		134	298	481	9	25	45	96	168	221	0	1	4	31	45	62	Ave
11		****	****	****	1500	7142	****	****	****	****	2	5	801	3183	9522	****	Var
3		239	523	901	39	85	141	216	444	661	1	2	28	56	98	182	Sdv
1	mcpm070	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Min
11	utpm049	1800	3600	5400	308	616	899	1764	3528	5292	10	12	250	290	718	1498	Max

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IN	CATNUMB	2B UNI	3A XT3	3A IMP	3B UND 390	3B UND 3490	4A MULT NOW	4B MULT FUT	4A LANN NOW	4B LANF FUT	5 PCX	5 XT3	5 PCL	5 IMP	6 NOW SSL ~~NEW DL~~	6 FUT SSL	6 NOW SSD	6 FUT SSD	6 VEN	6 VEN	6 IMP (NOW)
1	utpm002	1.0	1.0	3.0	1.0	2.0	30	70	0	0	4.0	1.0	1.0	3.0	2.0	3.0	2.0	3.0	4.0	4.0	2.0
1	utpm003	2.0	2.0	3.5	1.0	2.0	0	0	0	10	5.0	1.0	5.0	5.0	5.0	5.0	5.0	5.0	4.0	4.0	1.0
1	utpm004	3.0	4.0	1.0	2.0	2.0	0	2	0	0	4.0	4.0	1.0	3.0	5.0	5.0	2.0	2.0	3.0	4.0	1.0
1	utpm016	1.0	1.0	1.0	3.5	3.5	0	1	0	1	2.0	2.0	4.0	3.0	2.0	1.0	1.0	4.0	3.0	3.0	1.0
1	utpm017	1.0	2.5	1.0	3.0	3.0	0	0	0	0	3.0	2.0	1.0	3.0	4.0	5.0	4.0	5.0	3.0	3.0	2.0
1	utpm019	1.0	4.0	3.0	3.0	3.0	3	3	1	1	2.0	3.0	4.0	5.0	3.0	3.0	5.0	5.0	4.0	4.0	3.0
1	utpm021	4.0	1.0	1.0	5.0	5.0	0	4	0	0	5.0	1.0	5.0	0.0	5.0	5.0	4.0	5.0	5.0	5.0	5.0
1	utpm026	0.0	3.0	3.0	1.0	1.0	1	1	0	0	1.0	2.0	2.0	3.0	5.0	5.0	3.0	5.0	3.0	3.0	3.0
1	utpm033	3.5	1.0	1.0	5.0	5.0	0	0	0	7	4.0	2.0	4.0	2.0	3.0	3.0	3.0	4.0	3.0	3.0	3.0
1	utpm040	2.0	2.5	1.5	1.0	1.0	0	32	0	0	1.5	3.0	5.0	5.0	4.0	4.0	5.0	5.0	5.0	5.0	5.0
1	uepm206	3.0	0.0	1.0	1.0	1.0	2	1	0	0	5.0	3.0	1.0	1.0	5.0	5.0	1.0	1.0	4.0	4.0	1.0
1	uepm205	3.0	2.0	1.0	4.0	4.0	0	0	2	40	3.0	1.0	3.0	4.0	3.0	3.0	2.0	4.0	4.0	4.0	3.0
1	uepm204	3.0	5.0	0.0	2.0	2.0	0	27	1	11	3.0	5.0	5.0	3.5	4.0	4.0	5.0	5.0	5.0	5.0	1.5
1	mcpm904	4.0	1.0	1.0	5.0	5.0	0	0	0	5	4.0	2.0	5.0	4.0	5.0	4.0	5.0	5.0	3.0	3.0	4.0
1	mcpm401	1.0	2.0	4.0	2.0	2.0	3	21	1	1	4.0	2.5	4.0	4.0	5.0	5.0	1.0	2.0	4.0	4.0	2.0
1	mcpm870	4.0	4.0	2.0	2.0	3.0	0	0	0	3	1.0	3.0	5.0	2.0	4.0	2.0	4.0	5.0	2.0	4.0	1.0
16		*.*	*.*	*.*	*.*	*.*	39	162	5	79	*.*	*.*	*.*	*.*	*.*	*.*	*.*	*.*	*.*	*.*	*.*
Sum																					
1		2.3	2.3	1.8	2.6	2.8	2	10	0	5	3.2	2.3	3.4	3.2	4.0	3.9	3.3	4.1	3.7	3.9	2.4
Ave																					
0		1.7	2.0	1.4	2.3	2.0	55	366	0	10:	1.9	1.3	2.8	2.0	1.2	1.6	2.5	1.8	0.8	0.5	1.9
Var																					
0		1.3	1.4	1.2	1.5	1.4	7	19	1	10	1.4	1.1	1.7	1.4	1.1	1.3	1.6	1.3	0.9	0.7	1.4
Sdv																					
1	mcpm870	0.0	0.0	0.0	1.0	1.0	0	0	0	0	1.0	1.0	1.0	0.0	2.0	1.0	1.0	1.0	2.0	3.0	1.0
Min																					
1	utpm040	4.0	5.0	4.0	5.0	5.0	30	70	2	40	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max																					

Number of Observations: 16

2	mcpm910	2.0	4.0	5.0	4.0	5.0	0	0	3	3	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
2	mcpm705	0.0	5.0	5.0	3.0	3.0	0	0	0	0	1.0	2.0	4.0	3.0	5.0	5.0	3.0	5.0	4.0	5.0	3.0
2	mcpm999	2.0	2.0	3.0	2.0	2.0	0	0	0	2	4.0	1.0	3.0	2.0	4.0	4.0	1.0	3.0	2.0	2.0	0.0
2	utpm006	1.0	1.5	4.5	1.0	5.0	0	0	0	0	3.0	1.0	1.5	5.0	5.0	5.0	3.0	1.0	3.5	5.0	5.0	1.0
2	utpm005	1.0	3.5	3.5	1.0	1.0	0	0	0	0	3.0	3.0	1.0	5.0	3.0	4.5	3.0	4.5	3.0	3.0	1.0
2	utpm009	1.0	1.0	3.0	2.0	2.0	0	0	0	0	2.0	3.0	1.0	3.0	2.0	3.0	1.0	2.0	3.0	3.0	1.0
2	utpm014	0.0	3.0	4.0	1.0	1.0	0	0	0	1	4.0	1.5	4.0	3.0	5.0	5.0	5.0	5.0	5.0	5.0	1.0
2	utpm015	1.0	0.0	0.0	1.5	1.5	0	0	0	0	4.0	3.0	3.0	3.0	4.0	2.0	2.0	4.0	5.0	5.0	1.5
2	utpm018	1.0	4.0	3.0	3.0	3.0	0	0	0	3	1.0	1.0	4.0	5.0	3.0	3.0	1.0	1.0	1.0	2.0	4.0
2	utpm023	0.0	1.0	3.0	2.0	2.0	0	0	0	1	3.5	1.0	3.0	3.0	3.0	1.0	1.0	1.0	2.0	2.0	3.0
2	utpm024	5.0	3.0	3.0	2.0	2.0	1	12	0	0	5.0	3.0	2.0	4.0	5.0	5.0	3.0	5.0	2.0	3.0	5.0
2	utpm025	0.0	1.0	1.0	1.0	1.0	2	2	0	200	1.0	5.0	5.0	1.0	5.0	5.0	5.0	5.0	5.0	5.0	1.0
2	utpm027	4.0	1.0	3.0	5.0	5.0	0	12	0	12	4.0	5.0	5.0	5.0	4.0	4.0	2.0	5.0	5.0	5.0	1.0
2	utpm035	1.0	1.0	0.0	5.0	5.0	0	0	0	0	5.0	1.0	3.0	1.0	4.0	4.0	0.0	3.0	0.0	4.0	3.0
2	utpm037	1.0	1.0	1.0	5.0	5.0	0	0	0	1	5.0	1.0	2.5	1.0	3.0	1.0	1.0	4.0	2.0	5.0	1.0
2	utpm039	2.0	3.0	3.0	3.0	3.0	0	0	0	0	5.0	3.0	2.0	5.0	5.0	5.0	5.0	5.0	4.0	4.0	2.0
2	utpm041	1.0	3.0	4.0	2.0	2.0	0	0	0	0	3.5	4.5	0.0	5.0	4.0	3.0	3.0	5.0	5.0	5.0	1.0
2	utpm042	4.0	2.0	4.0	4.0	4.0	0	100	0	0	4.0	1.5	3.5	4.0	4.0	3.0	3.0	4.0	5.0	5.0	2.0
2	uepm210	2.0	2.0	4.0	3.0	3.0	1	5	0	4	4.0	2.5	4.0	4.0	5.0	4.0	1.0	4.0	4.0	4.0	1.0
2	uepm211	2.0	2.0	2.0	1.0	1.0	0	3	0	4	4.0	2.0	4.0	3.0	5.0	4.0	2.0	4.0	5.0	4.0	1.0
2	uepm208	1.0	4.0	4.0	4.0	4.0	5	10	0	0	5.0	4.0	2.0	5.0	5.0	5.0	2.0	4.0	5.0	5.0	1.0
2	uepm202	1.0	1.0	4.0	4.0	4.0	0	1	0	0	4.0	1.0	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0	1.0

2	mcpm903	2.5	2.0	4.5	2.5	4.0	1	7	1	3	4.5	2.0	2.0	4.0	4.0	4.0	2.0	3.5	4.0	4.0	1.5
2	mcpm902	0.0	3.0	4.0	2.0	2.0	0	0	0	0	2.0	2.0	2.0	2.0	2.0	4.0	2.0	2.0	0.0	0.0	1.0
2	mcpm901	1.0	5.0	4.0	2.0	3.0	0	0	0	0	4.0	5.0	5.0	5.0	4.0	4.0	5.0	5.0	5.0	5.0	3.0
2	mcpm402	2.0	1.0	3.5	2.0	2.0	1	15	0	3	2.5	1.0	2.0	2.5	2.0	1.5	0.5	2.0	2.0	2.5	1.5

IN	CATNUMB	UNI	XT3	IMP	UND	UND	MULT	MULT	LANN	LANF	PCX	XT3	PCL	IMP	SSL	SSL	SSD	SSD	VEN	VEN	IHN
52		*.*	*.*	*.*	*.*	*.*	11	167	4	237	*.*	*.*	*.*	*.*	*.*	*.*	*.*	*.*	*.*	*.*	*.*
Sum																					
2		1.5	2.3	3.2	2.6	2.9	0	6	0	9	3.6	2.5	3.0	3.6	4.0	3.7	2.6	4.0	3.5	3.8	1.8
Ave																					
0		1.6	1.9	1.9	1.7	2.0	1	385	0	1522	1.7	2.1	2.0	2.0	1.1	1.5	2.6	1.4	3.0	2.3	1.7
Var																					
0		1.3	1.4	1.4	1.3	1.4	1	20	1	39	1.3	1.5	1.4	1.4	1.0	1.2	1.6	1.2	1.7	1.5	1.3
Sdv																					
2	mcpm402	0.0	0.0	0.0	1.0	1.0	0	0	0	0	1.0	1.0	0.0	1.0	2.0	1.0	0.0	1.0	0.0	0.0	0.0
Min																					
2	utpm042	5.0	5.0	5.0	5.0	5.0	5	100	3	200	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max																					

(2)

Number of Observations: 26

5	utpm028	5.0	2.0	4.0	4.0	4.0	2	6	0	6	3.0	4.0	4.0	4.0	3.0	3.0	3.0	4.0	3.0	3.0	4.0
5	utpm043	3.0	2.0	2.0	4.0	4.0	0	10	0	20	5.0	5.0	5.0	5.0	5.0	5.0	2.0	1.0	5.0	5.0	5.0
5	utpm045	4.5	1.5	1.0	3.0	3.0	2	2	0	23	5.0	1.0	4.0	2.0	5.0	5.0	4.0	4.0	4.0	4.0	4.5
5	utpm046	2.0	3.0	3.0	2.0	2.0	0	0	2	2	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0
5	utpm047	3.0	2.5	1.5	3.0	3.0	3	1500	3	1500	1.0	4.0	5.0	4.0	2.0	2.0	5.0	5.0	5.0	5.0	4.0
5	uepm209	1.5	2.0	2.5	1.0	2.0	0	0	0	2	4.0	2.0	4.0	3.0	4.0	3.0	2.0	4.0	5.0	3.0	1.0
5	uepm213	1.0	1.0	5.0	1.0	1.0	0	0	0	11	3.0	1.0	3.0	4.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0
5	mcpm909	4.0	1.0	3.0	4.0	4.0	0	70	0	10	5.0	1.0	4.0	3.0	5.0	5.0	2.0	2.0	3.0	3.0	5.0
5	uepm207	3.0	5.0	5.0	2.0	2.0	0	320	0	80	4.0	4.0	4.0	4.0	5.0	5.0	5.0	5.0	5.0	4.0	4.0
5	mcpm907	3.0	1.0	1.0	2.0	2.0	0	0	0	0	5.0	2.0	4.0	2.5	5.0	5.0	5.0	5.0	5.0	5.0	4.0
5	mcpm906	1.0	5.0	0.0	3.0	1.5	0	7	0	0	1.0	5.0	1.0	4.0	5.0	5.0	5.0	5.0	1.0	1.0	2.0

55		*.*	*.*	*.*	*.*	*.*	7	1915	5	1654	*.*	*.*	*.*	*.*	*.*	*.*	*.*	*.*	*.*	*.*	*.*
Sum																					
5		2.8	2.4	2.5	2.6	2.6	1	174	0	150	3.7	3.1	3.9	3.7	4.5	4.1	3.8	4.5	4.1	3.9	3.3
Ave																					
0		1.8	2.1	2.7	1.3	1.1	1	****	1	****	2.4	2.9	1.3	0.9	1.1	1.7	2.4	0.9	1.7	1.7	1.7
Var																					
0		1.3	1.5	1.7	1.1	1.1	1	450	1	448	1.6	1.7	1.1	1.0	1.0	1.3	1.5	0.9	1.3	1.3	1.3
Sdv																					
5	mcpm906	1.0	1.0	0.0	1.0	1.0	0	0	0	0	1.0	1.0	1.0	2.0	2.0	2.0	1.0	2.0	1.0	1.0	1.0
Min																					
5	utpm047	5.0	5.0	5.0	4.0	4.0	3	1500	3	1500	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max																					

(5)

Number of Observations: 11

8	utpm001	3.0	2.0	4.5	1.0	5.0	5	5	0	55	3.0	1.0	5.0	5.0	5.0	4.0	1.0	5.0	5.0	5.0	1.0
8	utpm007	1.0	4.0	4.0	2.0	3.0	0	0	0	1	4.0	2.0	4.0	4.0	4.0	5.0	4.0	5.0	2.0	5.0	2.0
8	utpm008	1.0	1.0	4.0	1.0	2.0	0	0	0	0	4.0	3.0	4.0	4.0	4.0	4.0	2.0	4.0	3.0	1.0	2.0
8	utpm010	2.0	2.0	3.0	4.0	4.0	3	3	7	21	1.0	1.0	5.0	5.0	2.0	1.0	4.0	4.0	4.0	4.0	5.0
8	utpm011	1.0	4.0	4.0	2.0	2.0	0	0	0	0	3.5	1.0	0.0	4.0	3.0	3.0	3.0	4.0	2.0	4.0	3.0

8	utpm013	0.0	4.0	4.0	5.0	5.0	0	0	0	0	2.0	3.0	5.0	1.0	5.0	5.0	2.0	4.0	5.0	5.0	1.0
8	utpm020	1.0	0.0	4.0	1.0	1.0	10	10	10	10	3.0	4.0	5.0	4.0	5.0	4.0	2.0	4.0	2.0	0.0	2.0
8	utpm022	0.0	0.0	3.0	3.0	3.0	1	1	0	0	2.0	0.0	3.0	5.0	5.0	3.0	1.0	4.0	5.0	5.0	1.0
8	utpm032	3.0	1.0	1.0	3.0	3.0	0	0	0	0	5.0	1.0	1.0	1.0	1.0	4.0	0.0	4.0	0.0	4.5	0.0
8	utpm031	0.0	0.0	4.0	3.0	4.0	0	0	0	0	0.0	0.0	0.0	0.0	4.0	3.0	1.0	5.0	2.0	3.5	2.0
8	utpm036	0.0	2.0	3.0	3.0	5.0	0	1	1	0	2.0	4.0	3.0	3.0	4.0	4.0	1.0	2.0	2.0	4.0	2.0
8	utpm038	0.0	4.0	5.0	5.0	3.0	0	0	0	1	4.0	0.0	5.0	5.0	5.0	5.0	1.0	5.0	5.0	5.0	2.0
8	utpm048	1.0	2.5	3.5	0.0	0.0	0	0	0	0	1.0	1.0	1.0	4.0	4.0	4.0	3.0	4.0	5.0	5.0	3.5
8	uepm212	1.0	4.0	4.0	0.0	0.0	0	0	15	100	5.0	4.0	2.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	3.0
8	uepm203	3.0	0.0	4.5	0.0	1.5	0	0	0	10	3.0	1.0	3.0	4.5	4.0	3.0	5.0	5.0	5.0	5.0	1.0
8	uepm201	1.0	3.0	2.0	1.0	1.0	0	0	0	0	2.0	2.0	1.0	2.0	5.0	5.0	4.0	4.0	5.0	5.0	2.0
8	mcpm905	2.0	1.0	1.0	3.0	3.0	300	300	0	0	2.0	1.0	4.0	5.0	3.0	2.0	2.0	4.0	4.0	4.0	2.0
8	mcpm403	2.5	4.5	4.5	5.0	5.0	3	50	1	10	2.0	0.0	4.5	4.5	4.0	2.0	2.0	4.0	4.0	4.0	2.0
**		*.*	*.*	*.*	*.*	*.*	322	370	34	208	*.*	*.*	*.*	*.*	*.*	*.*	*.*	*.*	*.*	*.*	*.*
Sum																					
8		1.3	2.2	3.5	2.3	2.8	18	21	2	12	2.7	1.6	3.1	3.7	4.0	3.7	2.4	4.2	3.6	4.1	2.0
Ave																					

(8)

Page 3

IN	CATNUMB	UNI	XT3	IMP	UND	UND	MULT	MULT	LANN	LANF	PCX	XT3	PCL	IMP	SSL	SSL	SSD	SSD	VEN	VEN	IHN
0		1.2	2.7	1.3	2.9	2.8	4964	5002	18	668	1.9	2.0	3.3	2.6	1.3	1.4	2.3	0.5	2.5	2.0	1.2
Var																					
0		1.1	1.6	1.2	1.7	1.7	70	71	4	26	1.4	1.4	1.8	1.6	1.1	1.2	1.5	0.7	1.6	1.4	1.1
Sdv																					
8	mcpm403	0.0	0.0	1.0	0.0	0.0	0	0	0	0	0.0	0.0	0.0	0.0	1.0	1.0	0.0	2.0	0.0	0.0	0.0
Min																					
8	utpm048	3.0	4.5	5.0	5.0	5.0	300	300	15	100	5.0	4.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max																					

Number of Observations: 18

11	mcpm704	1.0	5.0	3.0	4.0	4.0	0	1	1	3	5.0	5.0	5.0	5.0	5.0	5.0	2.0	4.0	1.0	2.0	0.0
11	utpm030	0.0	3.0	3.0	1.0	1.0	0	0	1	1	5.0	2.0	2.0	3.0	5.0	3.0	5.0	5.0	5.0	5.0	3.0
11	utpm034	0.0	1.0	1.0	3.0	5.0	0	0	0	0	5.0	2.5	3.5	1.5	3.0	5.0	2.0	4.0	3.0	5.0	1.0
11	utpm049	3.0	2.0	5.0	4.0	5.0	1	1	1	1	4.0	2.0	4.0	5.0	5.0	5.0	2.0	5.0	3.0	3.0	5.0
11	utpm044	3.0	1.5	4.0	3.0	3.0	0	24	0	24	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.0	3.0	3.0
11	mcpm908	0.0	2.0	3.0	3.0	3.0	0	0	0	300	1.0	2.0	4.0	3.0	4.0	4.0	2.0	5.0	4.0	4.0	2.0
11	mcpm404	1.0	2.0	4.0	2.0	2.0	0	1	0	1	4.0	1.0	5.0	4.0	5.0	4.0	2.0	4.0	3.0	3.0	1.0
77		8.0	*.*	*.*	*.*	*.*	1	27	3	330	*.*	*.*	*.*	*.*	*.*	*.*	*.*	*.*	*.*	*.*	*.*
Sum																					
11		1.1	2.4	3.3	2.9	3.3	0	4	0	47	4.0	2.6	3.9	3.6	4.4	4.3	2.7	4.4	3.1	3.6	2.1
Ave																					
0		1.8	1.7	1.6	1.1	2.2	0	79	0	****	2.0	1.9	1.0	1.6	0.6	0.6	1.6	0.3	1.5	1.3	2.8
Var																					
0		1.3	1.3	1.3	1.1	1.5	0	9	1	112	1.4	1.4	1.0	1.2	0.8	0.8	1.3	0.5	1.2	1.1	1.7
Sdv																					
11	mcpm404	0.0	1.0	1.0	1.0	1.0	0	0	0	0	1.0	1.0	2.0	1.5	3.0	3.0	2.0	4.0	1.0	2.0	0.0
Min																					
11	utpm049	3.0	5.0	5.0	4.0	5.0	1	24	1	300	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max																					

(11)

Number of Observations: 7

**		*.*	*.*	*.*	*.*	*.*	380	2641	695	51	2508	*.*	*.*	*.*	*.*	*.*	*.*	*.*	*.*	*.*	*.*	*.*
Sum																						
4		1.8	2.3	2.9	2.6	2.8	5	34	5.10	1	32	3.4	2.4	3.3	3.5	4.1	3.8	2.9	4.2	3.6	3.9	2.2
Ave																						
11		1.8	2.0	2.1	1.9	2.0	1159	****		5	****	2.0	2.1	2.3	1.9	1.1	1.4	2.5	1.1	2.1	1.6	1.9
Var																						
3		1.4	1.4	1.4	1.4	1.4	34	176		2	174	1.4	1.5	1.5	1.4	1.0	1.2	1.6	1.0	1.4	1.3	1.4
Sdv																						
1	mcpm070	0.0	0.0	0.0	0.0	0.0	0	0		0	0	0.0	0.0	0.0	0.0	1.0	1.0	0.0	1.0	0.0	0.0	0.0
Min																						
11	utpm049	5.0	5.0	5.0	5.0	5.0	300	1500		15	1500	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max																						

Number of Observations: 78

	lg	med
3220 PC, XT320	35%	25%
Unix	24%	8%

Doing something in two yrs

Other PCs	lg	med
now	24%	~~[illegible]~~ 19%
2 yrs	14%	8%

Total PC		
now	8864	1611
2 yrs	31848	5708
	259%	254%

Apr 10

To: [illegible] Fr TOP
(Ad to Lara)
Re: [illegible] processing & reporting

1. Debt corrections

- I Lara & I have discussed, there are a number of cases where we have an item count for 1983 but none for 88 & 85. These should be filled in. Attached are pages with the words that I caught

- Check possible anomaly on p3 against questionnaire

- Change ind code from 13 to 5

2. Insert frequency counts

- Ok to round off

- Must go up to 20 to handle open ended Q

3. Calc. [illegible] on total records (78) as [illegible]

[illegible] observations

4. [illegible] Co. size code

5. Provide subtotaled sorts on

- Industry code
- Industry size code

6. Sort on individual fields in 2 or 3 groupings with subtotals for questions marked "sort" on attached questionnaire (grouping criteria shown)

7. • Anything done Wed send to me via DHL

- Send out ~~[illegible]~~ remainder Fri (for Sat delivery) to TCF c/o

1. Date of [illegible] & total income (7d) on

2. [illegible] Observation

3. [illegible] Co. [illegible]

5. Phone [illegible]

110 no increase
111 interdepartment/shared missions
112 low need
113 specific DB
114 need access
115 IBM/DEC
116 IBM/DEC/X
117 IBM/non-DEC
118 TSO/CICS
119 CMS/CICS
120 IMS DC/CICS
121 TSO/CMS
122 IMS/TSO
123 IBM/non-IBM
124 Other IMS Combos
125 IMS/Adabas
126 DL/I IMS-IDMS
127 IMS/SQL
128 IMS/Other
129 IMS/4GL
130 Other 4GL
131 4GL
132 DB2
133 IDMS-R
134 Vend experience/products
*138 Vend char.
135 Historical
136 no dealings
137 no help
139 - In house
146 backlog/productivity/efficiency timeliness
141 user friend/satisfaction
142 load off MF/access rptg.
143 Vendor assistance/pkgs
144 Technical solutions

59 use pkgs. / no expertise
~~60~~ cost
61 time-frame
62 away from MF
63 "most"
64 need corporate data
65 need response / interactive
66 Qualified
67 need both
68 too much work / not easy
69 easy / can do
70 SW architecture / integrity / investment
71 DB / interface
72 viable / possible / logical
73 cost effective
74 unlikely / problem
75 no problem / past success
76 unsuccessful
77 data transfer / ~~comm~~ timeliness / data currency
commun. / linkage.
78 specific data problems
79 prioritize / audits / standard / control
80 Vendor
81 Technical - synch, data arch, extract
programs, host. design
82 DB admin
83 specific technical - hard coded
password, controllers

84 ~~backup~~ security
85 backup
86 usr illiteracy / lack of ed
uncontrolled user
87 access
88 polluted data
89 password, lock diskettes,
hard disks, sw shells
90 little / none
91 sales & marketing
92 personnel / human resources
93 Market Research
94 Program development
95 scientific / engineering
96 DB Inquiry / reporting
97 inventory / purch
98 analysis
99 Planning, 4GL, Forecasting,
Budget, Decision Supp
Fin analysis, Order Entry,
Data Coll
101
102 mfg. / prod. planning
103 batch
104 ind. specific
105 inc. use / users
106 specific application
107 communs. / EMS
108 workstation / replace term.
109 no decrease

1 DK
2 none
3 specific plans
4 evaluating
5 announced/announced
6 depends on IBM
7 depends on ATT
8 not VM
multi-users/
9 multi process
10 Other
11
12 programmer tool
13 download
14 not IBM
15 windowing
16 host access
17 SW capability
18 speed
19 Burroughs
20 DEC
21 Wang
22 Turnkey
23 Altos
24 Northern Telecomm
25 CCI
26 Fortune
27 IBM
28 Financial Analysis
29 Graphics
30 WP/Office auto
31 Spreadsheets
32 PC type
33 Vestra
34 Comms/Omninet
35 Business Applications
36 Accounting
37 Engineering
38 AT+T
39 Manufacturing
40 functional
41 departmental/decent.
42 Currently doing
43 Trend/Need
44 hosthound
45 LANS
46 workstation/PC term
47 share data
48 high need
49 redundancy
50 more use/new pkgs
51 reserved
52 mainframe umbrella
53 access
54 data avail/IC
55 in-house
56 better/specialized
57 outside source
58 462/good tools

CONFIDENTIAL

INPUT QUESTIONNAIRE

CATALOG. N
SIC. COD
SIZE CODE
AREA CODE
STUDY CODE
DATES

STUDY TITLE:
TYPE OF INTERVIEW: ☐ VENDOR ☑ USER ☑ TELEPHONE ☐ ON-SITE ☐ MAIL

(M)

INTERVIEWER: Theresa Cooney

COMPANY: First City Bancorporation CO. TYPE: Banking

ADDRESS: 1001 Fannin
P.O. Box 2387
Houston, Tx 77001
(713) 658-6760

SALES:

NO. EMPL:

INDUSTRY ☐

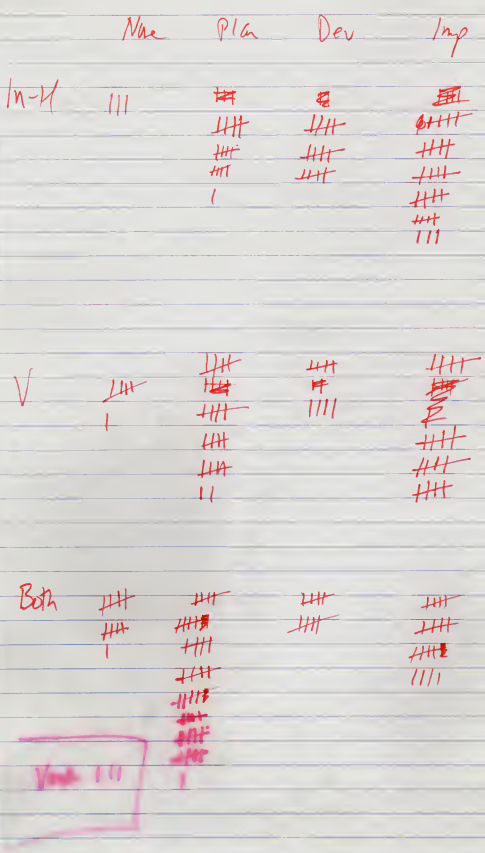
1 ☐ DISCRETE MANUFACTURING
2 ☐ PROCESS MANUFACTURING
☐ TRANSPORTATION
☐ MEDICAL
5 ☐ SERVICES
☐ UTILITIES
☐ RETAIL
8 ☒ BANKING
☐ WHOLESALE
☐ OTHER
// ☐ INSURANCE
☐ GOVERNMENT - FEDERAL
☐ GOVERNMENT - STATE & LOCAL
☐ EDUCATION

INTERVIEWS

NAME	TITLE	TELEPHONE NO.
Bob Michael	Manager Communications & Planning	(713) 658-6760

SUMMARY

REFERENCES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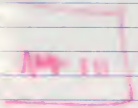

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Neg	21	- 1.7	
Neutral	5	0	

Pos-Rating		%
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3.5-4	= 7	12
2.5-3	= 19	32
1.5-2	= 17	29
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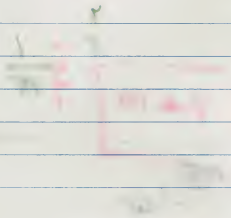

U-EPM
BACKUP

END-USER MICRO-MAINFRAME NEEDS

JULY 1984

U-EPM

END-USER MICRO-MAINFRAME NEEDS

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I

I INTRODUCTION

A. BACKGROUND

- The micro-mainframe issue is one that scored high in INPUT's 1983 client poll. Since then, interest has continued to climb, assisted by a barrage of vendor announcements.

- However, the profusion of announcements of products (and some pseudo-products) has made it in some ways more difficult to identify and understand the real issues. Most current vendor products ~~as well as~~ and corporate plans are ~~usually~~ preliminary, where they are not primitive.

- INPUT believes that the group of issues united under the banner "micro-mainframe" could produce a discontinuity in data processing at least as large as that produced by the introduction of the System/360. With this view, the micro-mainframe question becomes much more than a question of, for example, screen versus file transfer.

- INPUT intends that the studies contained in this series of reports (see section C of this chapter) be useful planning documents over a three- to five-year planning horizon, although the reports do not neglect current issues or technical detail.

- The study generally assumes that the micro-mainframe world is an IBM world (or an IBM-compatible world, which in many ways is the same thing). This has obviously been true for some time at the mainframe level and the issue will not be belabored here.

- At the micro level this assumption is still somewhat debatable; for example, Apple's Macintosh and ATT's recently announced computer series may still provide a basis for corporate micro-mainframe strategies. However, two key points should be made:

  - IBM's current interconnect strategy will provide an underlying environment for (IS) Information Systems end users, and vendors, as shown in Exhibit I-1. I-1

  - Equally important is the view held by IS departments. The non-IBM-compatible share of corporate micros is expected by IS management to be very low compared to IBM and IBM-compatibles, as shown in Exhibit I-2. I-2

- This does not mean that there is not and will not be a place for innovative micro hardware in large enterprises. However, from the standpoint of micro-mainframe connectivity, such devices will have to look like comparable IBM-compatible equipment in order to be easily used and accepted; or at least they must be transparent to IBM networks.

B. METHODOLOGY

o The research for this report was conducted in parallel with that for three related reports (see next section). A large project team spent over four months researching and analyzing information in this rapidly changing area. The research consisted of the following major activities:

  - Client interviews.

  - Corporate interviews, case studies, and consulting.

  - Vendor interviews, case studies, and consulting.

Hunter — I stet'ed this, even though it's a single bulleted item, to avoid changing final copy. 7/18 -rk

- Product and service analyses.

o Client interviews. INPUT clients were sampled in December and January to ascertain their areas of special interest and to learn of their experiences, problems, and needs.

o Corporate interviews.

- Seventy-eight structured interviews were conducted with IS management at large companies in February and March of 1984.

  . The questionnaire used is in Appendix A. A ✓

  . Company sizes and industries are shown in Appendix B. B ✓

- These interviews were unusual, owing to the fact that they were much longer than typical interviews (i.e., averaging 45 minutes to over an hour); ~~although~~ respondents were highly motivated and forthcoming.

- In addition, INPUT had the opportunity to review over 20 companies in depth. Some of the experiences of these companies are described in the reports in detail; other information was used to inform our analysis and recommendations.

- In the past nine months, INPUT has conducted a number of consulting studies that bear on the micro-mainframe issue. Five of these studies have specifically addressed micro-mainframe issues from the corporate standpoint, and the knowledge gained is relayed in this report.

o Vendor interviews.

- Structured interviews were conducted with vendor personnel from 20 companies in February and March. The questionnaire used is shown in Appendix C. C ✓

- In addition, more than 30 other people from vendor organizations were interviewed in particular issue areas.

- Vendors, too, were highly interested in the topic and were quite forthcoming. A number of interviews were multi-hour in length. Those interviewed ranged from senior technical staff to company presidents. The companies included small, innovative software firms and very large hardware companies.

- INPUT's recent consulting studies have included four that address vendor micro-mainframe issues. Although no proprietary information from these engagements was used directly for these public studies, these engagements have provided INPUT with an in-depth sensitivity to vendor requirements.

o Product and service analysis.

- INPUT has collected and analyzed information on several hundred products and services in the micro-mainframe area.

- Unfortunately, some of the information obtained at the beginning of the study is already obsolete. INPUT estimates that micro-mainframe technical and product information has a "half-life" of about six months. Several products will probably be formally available a short time after the release of this report. The rate of new product introduction has been very high, and INPUT expects it to continue; for example, there are high-speed micro-mainframe links from LAN vendors, and Cullinet has a micro-mainframe intelligent link.

- In general, micro-mainframe products are evolving very quickly. Consequently, extensive, detailed product comparisons will soon be out of date.

- Therefore, INPUT has used specific products largely to illustrate more basic issues. INPUT's goal has been to make this a study that would require only marginal updating to remain a useful planning tool a year from now.

- Some of the survey's quantitative results would have appeared surprising, even ~~doubtful~~ dubious, to the INPUT micro-mainframe project team had it not been for other micro-mainframe studies that INPUT has conducted in the past six months. - related

  - Several of these other studies included in-depth (i.e., one to two hours), face-to-face interviews conducted with:

    - Over 50 IS managers and planners.
    - Over 25 people in end-user management (up to the ~~EVP~~ executive vice president level in multibillion-dollar organizations).

  - These other studies are very supportive of the projections contained here and, from the standpoint of end-user motivations and plans, may even go beyond some of the findings here.

- Although the companies interviewed for this report were selected randomly, in a sense the respondents were not. But respondent self-selection has worked to the study's benefit, in INPUT's opinion.

  - Respondents were in IS executive or planning management, and the job titles have the usual distribution for this type of study.

  - However, in arranging interviews, INPUT was usually (and properly) directed to the person ~~who~~ that was most knowledgeable on micro-mainframe issues in that organization.

  - This person was almost always ahead of the rest of the organization in information and, more importantly, in insight. These respondents often know where their IS organizations are going before most others in the organization have even begun to consider the issues.

  - Fortunately, this brings the results of the survey much more in synch with end-user directions and motivation. (For obvious reasons, it is very important to understand where end users are going.)

C. OTHER RELATED INPUT REPORTS

- This report is being issued in conjunction with three other reports in the micro-mainframe series of reports, as shown in Exhibit I-3. These reports are:

  - Micro-Mainframe: Communications Issues

    - This report is part of the Information System Program (ISP) that is utilized by IS management.

    - This study addresses current developments as well as future trends in micro-mainframe communications.

    - The micro promises to have a significant impact on communications. This report analyzes positive and negative effects of these changes and provides strategies for dealing with them.

  - Micro-Mainframe: Personal Computer Impacts

    - This report is part of the Market Analysis and Planning Service (MAPS) that is utilized by information service vendors.

    - The study addresses and analyzes micro-mainframe developments and the impact they will have on the personal computer industry.

    - The report provides market forecasts and strategies for taking advantage of coming structural changes.

- Micro-Mainframe: Processing and Turnkey Strategies

  - This report is part of the Market Analysis and Planning Service (MAPS) program that is utilized by information service vendors.

  - This study analyzes micro-mainframe developments from the standpoint of their effect on traditional RCS and turnkey services.

  - The report provides market forecasts and strategies for adapting to a rapidly changing set of customer needs.

o These ~~three~~ four reports share a common core of concepts and data is presented to readers in the following way:

- The reports avoid (when possible) referring readers to pertinent sections of other reports, in order to make each report stand on its own.

- Data analyses or concepts that are discussed in more detail in other reports are summarized.

- Detailed information is included in appendices.

o Other related INPUT reports include:

- Selecting User Friendly Operating Systems for Personal Computers, June 1983.

- Executive Workstation Acceptance: Problems and Outlook, May 1984.

- Organizing the Information Center, August 1983.

- Supporting Personal Computer Software, August 1983.

- Data Administration: Experiences and Outlook, June 1984.

- Personal Computers in the I.S. Strategy, December 1982.

II EXECUTIVE SUMMARY

- This executive summary is designed in a presentation format in order to:
  - Help the busy reader quickly review key research findings.
  - Provide an executive presentation and script that facilitates group communications.
- The key points of the entire report are summarized in Exhibits II-1 through II-7. On the left-hand page facing each exhibit is a script explaining the exhibit's contents.

A. END-USER AND IS MANAGEMENT VIEWS OF THE MICRO

- Micros were viewed quite differently by end users and IS managers when they first began to appear on the corporate scene.

- End users saw the personal computer (PC) as a great breakthrough that allowed them to take charge of considerable amounts of their data processing destiny. The PC was:

  - Responsive: Jobs could be accomplished literally overnight without being filtered through intermediaries.

  - Flexible: Users were not locked into a particular approach but could build what were, in reality, prototypes.

  - Self-directed: Perhaps most important was being able to directly integrate and control data processing support.

- Even the Information Center (which did not exist at that time in many organizations) could not provide this kind of control.

- Many IS managers were unaware of the micro phenomenon; others did nothing, and some viewed the micro as a threat to orderly data processing.

- Toward the end of the early micro period, many IS departments recognized the micro and took steps to control, or at least to coordinate, its use.

- Most IS managers agree that their PC actions have been reactive and have generally not been a major influence on the amount or extent of end-user PC usage.

B. END-USER AND I.S. MANAGEMENT VIEWS OF MICRO-MAINFRAME LINKAGE

- History may be about to repeat itself ~~in~~ with regard to micro-mainframe linkage. However, there are much greater dangers from missteps in handling micro-mainframe issues, largely because end users and IS must work well and closely together if micro-mainframe efforts are to be successful.

- Most IS departments still see the micro-mainframe issue as business-as-usual. Looking at the situation from ~~their~~ IS's standpoint, control (i.e., restriction of access) becomes more important so that end users do not disrupt the operational system. Consistent with control, data generally flows downward, usually from file extracts. IS implicitly assumes that this data will generally be put to analytic use. That is, the next generation in connectivity will be supporting the next generation of spreadsheets.

- There is much to be said for this viewpoint, since this is the sort of activity that current vendor products are supporting. Also, most end users with some kind of micro-mainframe linkage are generally using downloaded data for analysis.

- However, INPUT's research and analysis strongly indicate that the picture is already very different in the minds of many end users. They see micro-mainframe links as providing not just the relatively limited ~~means to~~ self-direction they have with standalone micros, but also the potential for much greater self-determination. This means having two-way data flows.

  - Not surprisingly, given this view, users will increasingly be viewing operational and analytic use interchangeably.

C. MICRO-MAINFRAME APPLICATIONS GROWTH: 1984-1988

- INPUT forecasts that by 1988 about a quarter of installed mainframe applications will be micro-mainframe applications.
  - The potential range is from 20% to 35%.
  - These applications will be representative in type and complexity of today's host applications; hence, these figures generally will be representative of processing requirements as well.
  - ~~These~~ projections were based on INPUT's assessment of the likelihood of implementation plans being achieved and the attitudes toward micro-mainframe applications on the part of the corporations interviewed.
- This level of growth means that data processing systems will look far different in five years ~~than they do now~~. Planners must ~~start to adapt~~ prepare their IS organizations ~~to~~ for great changes. These changes will have significant impact on:
  - The technical nature of systems.
  - The IS organization and IS relations with end users.
  - In many cases, the way in which a corporation conducts its business.
- Before examining these impacts, ~~let's look at~~ two key attributes of "micro-mainframe applications" ~~the~~ should be examined further:
  - Shared functionality.
  - Connectivity alternatives.

D. SHARED FUNCTIONALITY: THE GOAL AND THE CHALLENGE

- INPUT has coined the term "shared functionality" to describe micro-mainframe applications where a data processing activity cannot be carried out without processing and/or data being shared by both the mainframe and micro.

- This view of shared functionality is ~~one that~~ held by 85% of INPUT's respondents ~~have~~ when ~~they speak of~~ referring to "micro-mainframe applications."

- Even more important is the fact that three-quarters of respondents see most applications that are now host-based as having this kind of shared functionality in three to five years.

- Shared functionality promises ~~to have~~ revolutionary changes ~~on~~ for computer systems and their implementation.

- Although most end users do not express themselves in technical language, when they are presented with this kind of diagram illustrating shared functionality, they say, "Of course this is what we want."

- There are serious technical issues to be overcome, however. These are discussed in the next two sections.

E. CONNECTIVITY ALTERNATIVES: INTERACTIVE VERSUS ON-LINE BATCH

- The interactive approach to connectivity is virtually impossible to achieve, given today's technical constraints.

  - In spite of that, three-quarters of INPUT's survey respondents believe the interactive mode will be used at least half the time.

  - It should be stressed that these were informed IS planners and managers, so obviously they were looking beyond what exists now, to what will--or should--exist in the future.

- In the short run, only on-line batch systems will be feasible. However, on-line batch applications will often appear to end users as being virtually interactive. The key issue is whether some of the micro-accessed data must be identical to that at the host level or whether data that ~~which~~ is periodically refreshed will serve just as well.

  - This is a key issue and should be the foundation of all micro-mainframe data analysis. This distinction has not had to be made for most current interactive systems, since the choices are generally ~~for~~ between totally on-line ~~or~~ and classical batch implementations.

  - Micro-mainframe systems will introduce an intermediate class of data and data analysis.

  - In the long run, when true interactive systems are possible, they may well make use of such resource-hungry tools as relational data bases. Consequently, the on-line batch approach will always have efficiency attractions. In addition, on-line batch applications will be easier to design and construct since many good design concepts such as restricted entry and exit points in modules will be enforced by the physical separation of devices.

F. MICRO-MAINFRAME DANGERS

- The danger of attempting interactive micro-mainframe applications prematurely has already been described. There are other large dangers in micro-mainframe applications, especially those that are poorly thought through.

  - Linking data across applications will become increasingly difficult if, as expected, local micro users will modify their data structures to best meet their local needs.

  - Security is something that even mainframe applications only pay lip service to, depending excessively on whatever is built in to applications packages or supplied in access control packages. Both physical security and data synchronization problems will develop new dimensions in a micro-mainframe environment.

  - Micro systems are noted for their flexibility. But by becoming connected to host-based systems they must give up at least part of it; the goal of designers will be to make this loss as small as possible.

  - Similarly, in a micro-mainframe application, neither the end user nor IS will have sole control. This can be disastrous where the two groups have different priorities or have not learned how to work together.

- A hidden danger is that current design and implementation policies usually will become obsolete or obsolescent in a micro-mainframe environment. Unfortunately, each IS group (for the time being) will have to devise a satisfactory methodology for itself.

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G. RECOMMENDATIONS

o Users should be educated on IS technology and issues. A general confidence-building strategy is also needed. This strategy may include: regular, informed, face-to-face meetings between IS management and its peers; a frankness in admitting IS problems and deficiencies; and objective ratings of IS performance.

- IS should take steps to gain a deeper understanding of the company's (and individual department's) key business goals, motivations, and problems.

- The IS PC support unit should be expanded to include all the functions outlined in INPUT's report, Supporting Personal Computer Software, August 1983. This is the most effective means for creating a deep understanding of micro opportunities and limitations.

- IS should initiate low-risk micro-mainframe projects as a learning tool and a confidence builder.

- Micro-mainframe initiatives may accelerate full or partial decentralization of applications-oriented functions to user departments. If not planned, such decentralization could have negative effects on both organizational and applications effectiveness.

- Because of the technical difficulties in moving into a true micro-mainframe environment, IS should enter into informal (or, if warranted, formal) arrangements with one or more vendors to find technical solutions to micro-mainframe issues.

III

III END-USER DIRECTIONS

A. INTRODUCTION

- Much attention has been focused on downloading data to spreadsheets and other micro programs. Several dozen such products have been released and are in users' hands, and at least as many more have been announced or are in beta testing.

  - Many of these products are certainly valuable tools, especially since the prior alternative was to manually key data (often from reports produced from mainframe systems). Manual rekeying is probably still the most prevalent form of micro-mainframe (M-M) interface.

  - However, it became clear in the course of the study that end users already have their sights raised considerably higher than to getting extracts of mainframe data to use in "calc" programs.

- Since this assertion may be difficult for some IS managers to accept, INPUT has developed case studies describing how six companies are attempting to push the edge of the feasible, from an M-M standpoint.

  - In some instances, details of the cases have been altered slightly to preserve anonymity of the companies involved. Commercial and vendor names (e.g., the PC/XT or UNIX) have been omitted unless they are considered generic.

  - At the end of each study, the salient findings are summarized.

- In the final section of this chapter, commonalities and differences between these M-M initiatives are described and analyzed, and overall conclusions are drawn.

B. A BANK'S MATRIXED DATA BASE

o A major bank's loan portfolio is kept in a centralized data base. The data in the loan portfolio must continually be consulted, analyzed, and updated by two principal types of users:

  - Loan teams--involved in procuring broker loans, real estate loans, offshore loans, commercial and industrial loans (e.g., energy, manufacturing, transportation), etc.

  - Portfolio management--cutting across loan areas to perform functions such as:

    . Reporting.

    . Auditing.

    . Collateral evaluation.

o These specialists have done their jobs in the past using a combination of terminal access and computer-generated reports. Over a year ago minicomputers were installed to download the broker and real estate portions of the data base so that they could be used directly by loan teams.

  - The minicomputers have proved to be quite successful, although the bank realizes that the application could as easily have been accomplished using PCs. The bank plans to "matrix" the central data base using PCs, as shown in Exhibit III-1.

III-1

- In many respects the PC alternative is seen as more attractive because of lower costs and because of the wide availability of packaged software readily usable by end users.

- The PC would be used to originate changes to the central loan data base, but this would not be uploading in the file transfer sense. Rather, the PC would originate transactions for entry through the conventional host system.

    - This is considered necessary for control and security.

    - Because this is a "matrixed" file, it is critical that the central file always be both the real and the official file. Otherwise, the portfolio management functions would be ineffective.

o However, the approach of mimicking traditional file transactions is felt to be too simplistic by some of the bank's systems planners. Some of the advanced proposals include:

- Using the XT/370 as the user PC (which shows a lack of understanding of the XT/370's capabilities, as discussed in Chapter V).

- Using a large PC or a small mini as a system controller between the PCs and the host system.

- Writing a parameter-driven package for reformatting data between the mainframe and PC, and deciding which data would be passed to the portfolio management subsystems.

    - This package would be designed to be reusable in other bank systems with similar needs.

    - However, by greatly (and needlessly) increasing the number of interfaces, the complexity of resulting systems would decrease security and probably render the software design unfeasible.

- Conclusions: The system as planned will undoubtedly be a success, because it is an evolutionary increment over prior systems.

  - Users and IS have learned to work well together.

  - While the IS technical staff would like to try out more "interesting" solutions, these are not used until proven.

C. THE MICRO AS CHANGE AGENT IN A RETAIL ORGANIZATION

- A large retail store has recently been upgrading its centralized hardware and software. Consequently, IS management has not paid much attention to the Merchandising Department's parallel acquisition of an IBM PC/XT.

  - IS believes that the XT will be used by Merchandising only for producing better ordering estimates to be used by the host-based purchasing/inventory management system, as shown in Exhibit III-2.

  III-2

  - However, the merchandising unit believes the XT will finally give them a chance to really know the status of orders.

- From the users' standpoint the problem with the host-based system is that it does not (and perhaps cannot) present an accurate view of the order situation during peak periods.

  - Although data is collected via terminals, the core system is really a batch system. The purchase authorization/order cycle can easily take a week before Merchandising knows that an order was received by a vendor. Transaction failures, corrections, and errors in any number of places make the system virtually unusable as an operational or management tool.

  - The buyers within the Merchandising Department, in consequence, have always maintained their own paper files to tell them what is really happening.

- The XT has become the system that is used for both analysis and operation by the Merchandising Department. There is even a good chance that the buyers will merge some or all of their paper files with the XT files as ~~they~~ buyers become comfortable with the XT. This evolving situation leaves IS in a difficult position.

  - The host system will not be completely replaced. Its central accounting and payable functions will remain. However, its perceived value added will be relatively low.

  - The Merchandising Department will tend to neglect host transactions in favor of XT transactions wherever there is a time or resource conflict. This will create increasing numbers of impurities in the central data base. This will be accentuated by the decreasing use of centrally prepared data by informed users so that data or processing anomalies will not be identified quickly (or at all). The corporate data base will be devalued ~~at best and, perhaps,~~ or valueless.

  - Since the Merchandising Department is highly motivated, the XT approach stands a good chance of success. To the extent that ~~they are~~ Merchandising is just added successful, the 3081 will become a sort of "back end" to the XT. IS may find it embarrassing to justify the significant increase in the expense of central data processing, ~~which they have just undertaken.~~ as a result of the new systems

- Both IS and general management ~~in the firm~~ are virtually oblivious to these problems.

  - Both are supportive of Merchandising's efforts to be "modern."

  - IS management is essentially technically oriented ~~and~~ does not understand how buyers must ~~operate if the retail operation is to prosper.~~ retail function.

- Conclusions: This project could become a success in spite of the technical pitfalls lying ahead.

- The end users want it to work and have clearly defined their own needs.

- It is more likely, however, that Merchandising, in meeting its own needs will needlessly damage the integrity of corporate data.

D. ORDER ENTRY IN CHEMICAL AND PETROLEUM COMPANIES

o Order entry is the critical operational underpinning to a company's marketing and financial success. However, people sometimes underestimate (or are unaware of) the complexity of many of the large computerized order entry systems that have been implemented in recent years.

- This ignorance of the complexity of underlying system and user needs among otherwise informed users, coupled with a sometimes naive belief in the powers of the PC, will cause increasing problems for some companies.

- This is the case for two large firms (a specialty chemical manufacturer and a petroleum product producer) INPUT interviewed. In both cases a sophisticated centralized order entry system has been developed over the last decade.

o Exhibit III-3 shows the main components of these order entry systems. These systems and their resulting problems are quite similar in their general design and operation and will be discussed jointly below.

III-3

- Note that "order processing" is only one of the system's functions and, arguably, not the most important one.

  . The order entry system is closely tied to several financial systems.

- The order entry process is increasingly seen as a logical extension of the production process--both the front end (production planning) and the back end (shipping and inventory).

- A very sophisticated set of data bases has been developed to support the order entry process:

  - Complex product and customer directories (coded information on subsidiaries, plant locations, even building and loading dock locations) have been developed.

  - Because of increasing price competition, the sales and marketing departments have developed an increasingly complicated, not to say confusing, set of discount arrangements. IS has successfully been able to capture this in computer logic (which is often changed), as shown in Exhibits III-4 and III-5.

III-4
III-5

o Because these systems are complex and cross many departmental boundaries, the order entry system does not have a departmental owner or champion. In fact, the only people who may fully understand the interrelationships of the various components are a few people on the IS staff (not including senior IS management). This has already had the following unfortunate consequences:

- The complexity of the system causes it to sometimes produce unexpected results that, while not being true errors, are still wrong in the eyes of users.

- Even when the system is functioning perfectly well, users must be educated on how apparently unexpected results are perfectly valid (e.g., the workings of the discount schedule).

- Because of these problems in user understanding, the IS staff is very cautious in accepting and implementing changes to the order entry system. This has produced enormous backlogs that have given both the order entry system and IS a very bad name among users.

- IS is the goodfaith defender of an adequately functioning system that produces significant corporate benefits. However, it receives no credit for this. ~~The situation is quite the reverse, in fact.~~ It is widely believed to be holding on to power by controlling this system.

o ~~It~~ should not be surprising ~~then~~ that when the first micros came on the scene in the early 1980s, many of the dispersed branch office users (supply points, sales offices, warehouses, etc.) saw the acquisition of an "order entry" PC as the solution to their problems in dealing with a quirky, difficult-to-use host system.

- These usually fuzzy and technically deficient requests were rejected individually by IS. Unfortunately, IS did not use this as an opportunity to educate all users on how (and why) their system operated. Instead, IS merely said that standalone PCs could not be fitted into an interactive environment.

- As different users saw how they had been "defeated" on this issue, increased resentment toward the perceived IS technocrats built up.

o ~~These users~~ have since become generally aware of the potential for M-M connections and have seen the potential for applying this to the order entry problem. The IBM 3270 PC has been an especially potent symbol for them (although the 3270 PC may not in fact be best suited to their needs). The dispersed users have learned from their past mistakes:

- They are approaching IS as a group so they cannot be "defeated" piecemeal.

- They are adopting what is to them a very plausible rationale:

  . The 3270 PCs are not meant to replace the main system but to supplement it, especially during peak periods.

- The local systems can deal more responsively with local customers and will, in fact, often have a better knowledge of local supply and inventory conditions than the centralized system will show.

- The local systems will faithfully produce transactions to feed the central systems so that no corporate information is lost.

- Because of bad feelings that have long existed and are increasing, this issue has become for the users as much an emotional and political issue as a business and systems problem.

o IS still does not see the order entry system as a central system extending its nerve endings throughout the corporation. IS management takes "order entry" at its face value and sees it more or less as the property of the branch locations that are agitating for change.

- The best response would be to fight fire with fire and mobilize the other heavy-hitter groups (e.g., marketing, manufacturing, finance) that interface with the system to protect their interests.

- Being politically naive and technically oriented, IS instead has suggested a systems study to see how an M-M link could be accommodated.

- This has only further infuriated the branch users, especially since they now believe that IS's anti-standalone-PC arguments were not made in good faith but were just excuses to save the "IS empire."

o The branch users have formulated difficult-to-deny requests for local customer lists and records, product volume and mix discounts, and transaction formats.

- They have a very simplified view of how the order entry system works from their standpoint, as shown in Exhibit III-6. III-6

- Either they are oblivious to the interplay between order entry and financial and manufacturing systems or they argue that their local information is better anyway.

- Because the centralized discount calculation has in fact worked well, they are often not aware of the complex and subtle factors that can routinely influence discounts. (Or when they are aware, they often would not wish to be constrained by central discount rules anyway.)

o In these two companies it is almost certain that multiple deviant local systems will be developed with little or no IS control or coordination.

- These deviant local systems are bound to corrupt the data that is going into the central system, which will increasingly be treated as a pro forma afterthought by the branch users.

- This, in turn, will shake the confidence of the headquarters users (finance, manufacturing, etc.), and they too may turn on IS and the central system with incalculable consequences.

o Conclusions: Win-win situations should always be a systems goal. Unfortunately, this has turned into a lose-lose situation.

- There is a gulf of ignorance between the end users and IS management.

  . The end users do not appreciate technical issues and problems.

  . Top IS managers have raised the drawbridge around their technical world.

- While IS is probably correct to say that a difficult technical problem needs more study, this is an answer that end users have heard too often.

- An organizational change is probably the only solution to this problem. That is, IS top management (at a minimum) would change.

and data processing functional responsibilities would possibly be restructured.

E. THE UNIX TIME BOMB

o A major energy firm has upgraded its information center services to provide downloaded data for use on IBM PCs, as shown in Exhibit III-7.

III-7

- In-house modification to an ASCII communications package enables host summary file data to be transmitted to PCs in VisiCalc-compatible form, as shown on line (a) of the exhibit.

- The service has worked well, even though downloading is handicapped by the low speed and unreliability inherent in asynchronous communications.

- The success of using PCs has whetted user appetites for more. However, users have had differing ideas on what "more" consists of.

  . Some want much more data than current methods allow; they also want to be able to perform much more complex analyses.

  . Others want to share data between users, either on the same machine or on different machines.

  . Still others want to take over analytic and, perhaps, operational tasks now performed on the host system.

  . Although they are knowledgeable about their own functions, the users are not very informed on data processing issues. They believe, however, that the capabilities represented by the PC/XT or similar machine will give them the upgrade needed.

- Some IS staff members (with no discouragement from IS management) have led users to believe that UNIX is the answer; ~~it is:~~ UNIX is:

  - Very powerful and flexible.

  - Able to provide function-specific "shells" to users.

  - Multi-user and multi-tasking.

  - Most suited for the more powerful micros, both current models and those on the horizon.

- This message has ~~fallen on fertile soil.~~ met a receptive audience. Many of the users have heard enough about UNIX to be predisposed in its favor. They are now pushing IS to:

  - Install UNIX software.

  - Implement UNIX-based micro systems.

  - Modify host systems to take account of these new locally based capabilities.

- IS management is willing to provide several UNIX experts (on a relatively junior staff level) to help users to make changes on a local basis. But IS management is totally unwilling to make a central IS commitment to a UNIX-type solution. The IS interest in UNIX is only one of a number of esoteric or experimental approaches that have gained moderate amounts of resources and backing within IS.

  - Although IS has spoken of decentralization and user-oriented development, what IS management means by this is:

    - User department funding of development and maintenance activities that are still centrally managed.

    - User involvement in ~~(even direction of)~~ the specific applications, including user direction of system development projects.

- An IS organization that is applications system oriented.

- IS itself is still centrally controlled and, equally important, still believes in massive host-based systems. IS's Its major financial commitment is still to traditional IMS-based systems. Its design philosophy still revolves around the traditional IMS-based systems as well.

- More tellingly, IS's its senior technical staff identifies very closely with large-scale IBM operating systems, DBMS's and communications systems. These people are highly skilled (and highly paid), and some are ~~conscious of~~ worried that their marketplace worth decreasing ~~if~~ a max UNIX (or other M-M approaches) begins to change the rules and practice of system building.

o Senior IS management is less emotionally committed to centralized solutions than is the senior technical staff. However, senior management is technically obsolescent, and managers are not willing to make decisions that go against their senior technical staff in areas perceived to be largely technical.

- Consequently, IS management has temporized on the UNIX issue. They did not discourage the UNIX missionaries, because:

  - The IS department has had a long tradition of being technically innovative.

  - "UNIX" is a powerful if not a very well understood word.

  - This corporation's users, like those of most user departments, have become restive as a result of backlogs, inflexible systems, etc.

  - IS management sincerely wants to put more capabilities into the hands of users.

- IS management does not fully understand the self-interest that is largely motivating its senior technical staff's opposition to UNIX. Consequently, IS management has fallen into the position of agreeing to UNIX use on a very limited basis; i.e., there will be:

  . No central IS-provided training or support.

  . No senior staff involvement.

  . No dislodgement or modification to current or planned host-based systems.

o Neither IS management nor the user departments are yet conscious of the magnitude of their problem; they are on a collision course.

  - IS believes that UNIX is only an upgrade to VisiCalc, as shown on line (a) of Exhibit III-7. In ~~their~~ IS's view, nothing essential should or can change in the technical or power relationships.

  - Key users, on the other hand, see UNIX-based systems as the beginning of independence from what are (in their view) torpid, ineffectual centralized systems, as shown on line (b) of the exhibit.

o ~~The~~ users do not understand the reasons for IS management and its senior technical staff's almost casual involvement in these technical issues.

  - ~~The~~ users have also tacitly assumed, but in a totally different way, that UNIX is only an upgrade to VisiCalc.

  - They believe that off-loaded host functions can be taken over as easily by using UNIX as downloaded data could be handled using VisiCalc. This is, of course, totally untrue but will become apparent to users only after a considerable expenditure of money and ~~especially, of~~ time.

o Note: For additional analysis of the UNIX issue, see Section A of Chapter V.

- Conclusions: Technical enthusiasts can often lead the uninitiated astray.

  - More tellingly, IS management has not adopted a well-thought-out position on what is a difficult and potentially disruptive issue.

  - Although no disaster will occur, there will be much wasted time and effort. ~~muddle~~. IS will ~~fall~~ lose face in the estimation of its users.

F. AN INSURER'S MICRO-MAINFRAME NONCONNECTION

- A leading property/casualty insurance company ~~had~~ decided several years ago to convert from a relatively primitive in-house system to a leading vendor's package. The IS department was the major proponent of the vendor selected.

  - Unfortunately, the initial stages of installation were not smooth, and key users became quite concerned ~~over:~~ about:

    - The length of time ~~(multiyear)~~ full installation would take, (several years).

    - The expense.

    - The changes ~~they~~ users would have to make to conform to the package (rather than vice versa).

    - The apparent inflexibility of the system, once installed.

  - In the meantime, the users had learned of a new vendor's micro-based software that appeared to them to have significant advantages, including:

    - Installation by independent line-of-business module (e.g., automobile, business owners, etc.).

    - High tailorability.

. Quick installation.

. Lower cost.

o The IS department was unwilling to examine this new alternative in view of the fact that much company time and money had been spent in reaching what, after all, was a contractual commitment with the first vendor.

- However, the users became increasingly convinced of the correctness of their position and elevated the question to CEO level.

- The IS vice-president refused to have anything to do with such a "wild" scheme, and when the dust had settled, one of the operational vice-presidents had assumed ~~project management~~ authority for implementing the micro-based system in a number of business areas.

  . The mainframe-based package was cancelled for ~~that~~ the commercial insurance part of the business.

  . IS was to play little role in the implementation.

o The stage was set for disaster.

- However, the disaster did not occur.

- The installation of the micro system has been a success, meeting almost all user expectations (many more expectations than most similar mainframe implementations meet).

- The success was due to a combination of the vendor's product and, especially, user commitment and involvement.

  . One of the features that the users found especially attractive about this product was that knowledgeable user personnel could interact directly with the software during system construction.

- This had a significant impact on speed, accuracy, and acceptance.

o In a way, the project has been too successful. The line-of-business managers are running what are, in essence, miniature data processing departments.

  - Data to support the traditional host-based accounting and statistical systems is rekeyed from micro output into the host system, as shown in Exhibit III-8.

  - This is an ironic mirror image of many current micro downloading practices.

o What is finally beginning to be discussed within the company is a means by which a new host data base could be constructed to collect data of corporate interest now being generated by the micros.

o Conclusions: The somewhat surprising success of this end-user initiative was due to deep commitment, good project leadership, and a good product foundation.

  - Unless the micro IS kingdoms are reintegrated, the inevitable problems of inconsistency and incompatibility will arise. This is doubly true since success was due partly to a fortunate combination of personalities.

  - There will be problems in after-the-fact integration of subsets of locally generated data into a corporate data base.

G. SUMMARY

o These six companies show a great diversity in ~~the types of~~ their M-M initiatives and the manner in which they arose, as shown in Exhibit III-9.

- One common thread is that success is highly dependent on the technical adequacy of the plan.

  - The two organizations with high success probabilities are both using proven technology. (The bank is using an evolutionary version of an earlier system; the insurance company is using a vendor's package.)

  - However, user understanding and commitment is necessary, too, for the "micro" part of micro-mainframe to work well.

- It is also noteworthy that in four of the six companies, the initiative came from users.

  - This was not surprising in view of the relatively low quality of relationships between IS and these users.

  - Users are taking these kinds of initiatives now in part because they are making an imperfect analogy:

    - Micros have proven easy, effective, and inexpensive to perform analytic work (indeed, better in these respects than host systems, in the eyes of many users).

    - Therefore, the same kind of benefits accrue when switching from analytic to operational uses. However, these uses are quite different, as shown in Exhibit III-10.

- It should be emphasized that these users were not concerning themselves with trivial issues; the micro-based systems they want are central to their operations.

  - In a way, it is a compliment to data processing and, perhaps even more so, to the mystique of the micro, that this should happen.

- It also symbolizes user frustration with conventional data processing, as the users see it. There is, unfortunately, little that IS can do to relieve these frustrations, at least in the short run.

o In organizations where IS-user relationships are not good, these user initiatives will grow more common, at least for a few years, until the news of the high casualty rates filters back from the front lines of M-M implementations.

IV

IV MICRO-MAINFRAME FUTURE DIRECTIONS

A. SHARED FUNCTIONALITY

- INPUT has coined the term "shared functionality" to describe one of the key characteristics of future M-M applications.

- The concept of shared functionality is straightforward; it is the sharing of processing and data between mainframe and micro, as shown in Exhibit IV-1. It is allied but distinct from older views of distributed data processing (DDP). DDP is different in that:

  - It was usually seen as being controlled from a central point, while shared functionality is based more on equality.

  - A major motivating force was IS efficiency, rather than meeting end-user needs.

  - Perhaps more importantly, DDP has always been more of a theoretical than an implementable approach.

- What is somewhat surprising is that fully 85% of the corporate respondents to the INPUT survey subscribe to this M-M view. (This percentage would be far more surprising if not for the circumstances described in Section B of Chapter I.)

  - The case studies in Chapter III bear out this attitude on the part of users.

IV-1

- Needless to say, this kind of M-M system does not exist in most companies today. In addition, based on INPUT's experience, many key people in IS organizations have not yet accepted this view. Rather, their view would be more like that in Exhibit IV-2, where suitably protected data flows from mainframes to micros, meaningful (i.e., nonanalytic) production processing is confined to mainframe systems.

IV-2

o Of course, this high level of agreement (that shared functionality is the chief characteristic of M-M applications) could have indicated agreement with ~~the~~ broad principles. Consequently, respondents were asked if they felt "most applications that are now host-based will (in three to five years) have a considerable amount of functionality taken over by personal computers linked to the host."

- Naturally, there was far more diversity here. However, three-quarters of respondents see host applications having these shared functionality characteristics within five years, as shown in Exhibit IV-3. About a quarter of all respondents were very positive in their support of this position; many were already, in fact, implementing M-M applications.

IV-3

- This is consistent with the fact that virtually all respondents were able to give several examples of M-M applications implemented or in the process of being implemented. While most of these were rather primitive, they were nontrivial.

o The average score supporting shared functionality (on a scale of +5 to -5) was +1.7. ~~This was skewed upward, however, with~~ the most favorable group having a score of +4.5 and the negative/neutral group ~~scoring~~ only -2.2.

o Generally speaking, the more positive attitudes toward shared functionality, as shown by Exhibit IV-4, were held by activist-type organizations; these organizations:

- Planned to use outside sources of assistance.

IV-4

- Were more aware of potential problems.

- Saw more complex uses of M-M links.

o Those organizations less positive toward shared functionality tend to be more passive in their plans for M-M connectivity, as shown in Exhibit IV-5.

IV-5

B. TYPES OF MICRO-MAINFRAME LINKAGES

o Conceptually, M-M connectivity ranges from the manual entry of previously unautomated data to interactive, segmented programs.

- Most current linkages are products relatively low in the connectivity "hierarchy," as shown in Exhibit IV-6.

IV-6

- However, the goal of shared functionality implies reaching the "4" or "5" level shown on the exhibit.

o This was confirmed by asking corporate IS respondents whether they saw M-M links as being:

- Predominantly interactive.

- Predominantly on-line batch (i.e., where the micro performs processing on a standalone basis and the micro and host periodically exchange data).

- Equally interactive and on-line batch.

o Somewhat surprisingly, three-quarters of the corporate IS respondents see half or more of their future linkages as being at least partially interactive, as shown in Exhibit IV-7.

IV-7

o This places the corporate respondents on the most demanding, leading edge of connectivity; that is, as shown in Exhibit IV-8, they require:

- Interactive access.

- On-demand file elements.

- Generalized (as opposed to vendor proprietary) files.

IV-9
-10
-11
12

o In contrast, vendor M-M links of a representative selection of leading vendors fall short in one or more areas, as shown in Exhibits IV-9 through IV-12.

o These vendor links are certainly only the first generation of such products. Candid vendors will admit that many (if not all) vendor links were rapidly put together to get products into the marketplace.

- Because of their origins, the vendor products have little in common, from the standpoint of concept, design, or operation. These products are generally very proprietary in nature (i.e., they link to a specific vendor's product at one or both ends of the link).

- As a class, these products should be viewed as stopgaps for vendors, IS departments, and users. They are certainly better than rekeying into spreadsheets but are probably not the foundation for long-term, key M-M systems. (In most cases)

o With this background, it is understandable that vendors were much more cautious than IS respondents were in judging the type of future M-M connectivity.

- Only half as many vendors as IS respondents saw interactive M-M applications predominating, as shown in Exhibit IV-13.

IV-13

- Three-quarters of vendors see on-line batch applications playing a key role; this is a mirror image of what IS respondents see.

- For reasons that will be explored more thoroughly in the next chapter, INPUT believes that the vendor assessment is more realistic: the

technology is largely here now for on-line batch applications, and this approach will always be easier to implement, with less risk.

C. DEVELOPMENT APPROACHES TO MICRO-MAINFRAME APPLICATIONS

- These are three basic strategies for developing M-M applications:
  - Modifying existing software.
  - Adding new application codes to an existing data base.
  - Writing entirely new applications.
- IS respondents were somewhat more in favor of the modification strategy than vendors were, as shown in Exhibit IV-14.

IV-14

  - Interestingly, vendors were somewhat more balanced in their appraisals and tended--more than IS staff did--to see new applications as necessary.
    - The vendors were undoubtedly affected by hopes that existing software or DBMS could be used (when the vendor respondents offered one).
    - Consequently, even the vendor assessment of the need for new applications is almost certainly an understatement.
    - INPUT believes that new applications will be needed for most non-trivial M-M applications because of the difficulty in retrofitting M-M applications to existing systems.
- Being committed to one particular strategy does not exclude support for other strategies. In fact, the corporations most in favor of a particular strategy supported other strategies as well, as shown in Exhibit IV-15.

IV-15

- o IS departments are not planning to go it alone. As reported earlier, most corporations have several M-M applications in place or in development.
  - Over half of these have relied on vendor assistance for at least part of the work, as shown in Exhibit IV-16.
  - However, for M-M projects in the planning or concept stage, fully 85% plan vendor involvement. This increase, in what was already a relatively large number, reflects:
    - . More difficult M-M projects.
    - . Increased vendor capabilities.
    - . An increased awareness of vendor capabilities.
- o The assistance received runs the gamut from:
  - Packages used without modification.
  - Packages used with extensive modification (quite common at this stage), with modification supplied by:
    - . In-house staff.
    - . Professional service firms.
  - Custom programming from outside vendors.

IV-16

V MICRO-MAINFRAME ISSUES

A. TECHNOLOGY ISSUES

- o There are three main technical issues affecting end-user M-M applications:
  - The XT/370.
  - UNIX.
  - Data synchronization.

1. THE XT/370

- o In concept, the XT/370 allows users to "have their cake and eat it too."
  - The "mainframe" is brought to the desktop.
  - The user has control of VM/CMS (virtual machine/conversational monitor system).
  - The whole library of VM software, both systems software and applications software, is available for immediate use. These can include quite heavy-duty applications.
  - With the VM pass-through facility, XT/370 users can potentially link into many other VM systems.

- However, on closer inspection, the XT/370 as it exists today suffers from profound limitations.

  - The XT/370 is not, in fact, a standalone machine. Current chips do not provide good memory management.

    - Therefore, while CMS is on the XT/370, VM itself still must reside on the host.

    - As new chips (like the 286 or 386) with much better memory management are available, it could become possible to have a self-contained XT/370.

  - Similarly, coping with VM/CMS takes up most of the power and space in the XT/370.

    - There is little room left for applications. When applications were put experimentally on the XT/370, performance was found to be quite marginal and unfeasible. usually

    - However, the XT/370 does have sufficient resources to serve the purpose outlined for it in IBM's initial announcement - a programmer's workstation. Functioning in this manner, the XT/370 is not overloaded and can provide predictable response time.

- Apart from technical limitations (which, after all, can be solved by applying more hardware resources), there is the larger issue of whether host-developed applications should be (or, in some cases, can be) put on a desktop.

  - "User friendly" is an overworked word but one that should be taken seriously when considering placing micro-based applications in user hands. Among the mounting criticisms of host-based systems in general are that they are difficult to:

    - Learn.

  - Use.

  - Adapt.

  - Control.

- Moving such unchanged applications out of the protective environment of the data processing professional and onto the desktop helps neither the end user nor IS.

- Host-oriented applications are not by nature susceptible to minor "tweaking" to make them suddenly user friendly.

  - Most host applications assume large data bases, intricate processing logic, and a web of supporting systems software. Response time is something that is spread out between many dozens, if not thousands, of users.

  - This maps poorly against the micro's strengths of having considerable amounts of processing power focused on relatively small amounts of data in order to provide exceptional response.

o A considerable number of organizations (corporations as well as vendors) do not fully appreciate these factors.

- Several corporations INPUT interviewed plan to use XT/370s in application settings.

- Two mainframe applications vendors have planned to put parts of their mainframe product onto the XT/370 as a way to get an "instant" micro product. One of these vendors attempting an instant product has already run into serious difficulties because of the capacity problems described above. (On the other hand, there are vendors like Information Builders, which rewrote FOCUS for the IBM PC.)

- o However, as first mentioned, the concept of the XT/370 fills many of the requirements for a true M-M system, including:
  - High power.
  - Host connectivity (i.e., VM pass-through).
  - Shared operating system environment.
  - Data sharing.
  - Potentially, applications and application program segmentation.
- o The promise of the XT/370 concept will be seen in later generations (the XT/3000?) and will have the capacity to do larger amounts of useful (i.e., applications) work. However, that will be only the first step.
  - It will be equally important, if not more so, to think through how applications logic and data should be distributed throughout the nodal network.
  - When this is done, it will represent a successful implementation of the early efforts of remote computing service (RCS) companies to distribute pieces of their applications onto micros. (The RCS firms' lack of success was caused by both technical limitations and commercially-derived inhibitions against placing too much functionality in the micro.)
  - Information Center activities would be a logical initial candidate, since solutions would be generalizable and under the control of IS.
  - Applications segmentation would have to be approached much more carefully because of the increased time, expense, and coordination involved.

- Both IS and vendor respondents see the XT/370 playing at least a moderate role in the future, as shown in Exhibit V-1.

  - INPUT knows that some of these positive assessments are based on a misunderstanding of the XT/370's current capabilities.

  - Consequently, IS management should be very careful in verifying any claims regarding the application virtues of the XT/370 as it now exists.

2. UNIX

- It is beyond the scope of this report to fully assess the current and future claims being made concerning UNIX. (For additional analysis, see INPUT's Executive Bulletin, An Unusually Noteworthy Introduction of a Xenolith. However, the following facts should be kept in mind:

  Is this still the title? Ja.

  - It is true that considerable percentage growth is being planned for UNIX-based micro hardware; however, this is starting from a very low base (0.1%) currently and will reach only 1.0% in 1986, among the INPUT respondents.

  - Most IS respondents saw UNIX as even less important than the XT/370 in their future plans, as shown in Exhibit V-2.

    V-2

  - The plethora of UNIX-like systems will discourage major software vendors from developing UNIX-based applications.

- It is true that UNIX's portability and ability to network between machines makes it appealing as a potential M-M vehicle.

  - However, this potential is largely untested in a corporate environment; much of the academic and scientific experience with UNIX is not pertinent for major business users. (See INPUT's 1983 report Selecting User Friendly Operating Systems for Personal Computers.)

- Most importantly, for some time to come, micro applications will have to link into conventional MVS or CMS systems. UNIX will have no more advantage than any other micro-based environment.

3. DATA SYNCHRONIZATION

o Data synchronization and data security issues generally are dealt with in more detail in this study's companion report, Micro-Mainframe: Communications Issues.

o However, the special case of synchronization, as shown in Exhibit V-3, directly impacts M-M system design and user feasibility issues. The facts as they stand are:

- Data synchronization of updates on a real-time basis between an independently processing mainframe and micro is not feasible now.

- Potentially, one or more of the relational DBMS vendors may find a solution to the concurrency, multiple-update, and lockout problems. Even if this is accomplished, these solutions in their initial versions will be both slow and inefficient. Thus, it is assumed that there cannot be any routine solution for these problems for some time to come.

- Consequently, the expressed desires for truly interactive M-M applications probably cannot be satisfied for several years, at best.

o However, on-line batch solutions may be acceptable in many situations. These are discussed at greater length in the next chapter.

B. PLANNING ISSUES

o In planning for M-M applications, planners must judge how M-M performs relative to traditional mainframe-based--as well as micro-based--systems, using a number of criteria including:

- Data linkage across applications.
- Application transparency.
- Environmental adaptability.
- Potential for central control.
- Flexibility in meeting user needs.
- Stability.
- Data synchronization.
- Operation economy.
- Operation speed.
- Implementation speed.

o Data linkage: Although DBMSs were originally conceived to unite data across applications, in practice it has often proved infeasible to do so because of complexity, control, and flexibility problems. These problems are worse in micros because of the relatively limited hardware and software environments.

  - At present, of course, linkages across M-M applications are not technically possible in a real-time environment.
  - On a batch basis they are only feasible where micro applications are treated as intelligent terminals feeding transactions to the mainframe system.

o Application transparency: This is the extent to which an application can be understood or comprehended, from both the user level and a technical level.

- Many host-based applications, because of their size and complexity, are rather opaque.

- On the other hand, micro-based systems--being smaller and closer to the end user--are much more comprehensible.

- M-M applications have the potential danger of adding yet another layer of complexity to host systems. To the extent that the host "system" is largely a data repository, this danger can be alleviated by placing as many logical and processing functions as possible at the micro level.

o Environmental adaptability: This is the extent to which physical environments can be changed (e.g., adding terminals to SNA systems) or an application can be moved to a new hardware or systems software environment. Host-based systems are adequate but clumsy in this regard. Micro systems are more hardware-bound.

- Potentially, UNIX-based systems allow an evolutionary path for both micro and M-M applications.

- However, UNIX is quite large (around nine megabytes) and is still essentially an unknown quantity in regard to commercial applications. The very profusion of UNIX variants makes any claim for universality a hollow one at this stage. (See the previous section on UNIX.)

- Otherwise, M-M applications would be even more environment-bound than their mainframe cousins.

o Potential for central control: Here host-based systems are obviously much superior to micro applications. M-M applications are at an intermediate point.

o User flexibility: Mainframe systems are notorious for their inflexibility (at least in user eyes), and micro systems (fairly or unfairly) are considered unbeatable. Depending on how tightly coupled to the host an M-M application is, it could be closer to a standalone micro system or as bad as (or worse than)

a mainframe system. (Micro applications written in assembler language are, of course, another problem altogether.)

- Stability: This is meant the extent to which an application's operations are error- and failure-free. While mainframe applications still have a long way to go, there are many facilities built into the hardware and software environment to assist in maintaining operations. Micro systems by nature are considerably more fragile, being without the supporting infrastructure one is accustomed to seeing in mainframe systems (e.g., audit tools).

- Data synchronization: Here the situation is very similar to the "stability" area above. This leaves out the current unsolved problem of synchronizing data in an interactive M-M environment.

- Operation economy and operation speed: Both micro and M-M applications can potentially be much better or worse than their mainframe equivalents.

- Implementation speed: Although large, complex mainframe systems often take years to implement, an M-M system that was implemented like a mainframe system would be worse. M-M systems that have more in common with off-the-shelf micro applications would be infinitely superior. However, modifying micro packages is itself an undertaking that can be difficult and frustrating.

- Exhibit V-4 summarizes the performance of each of the three implementation approaches and gives them a "grade" for each factor. V-4

  - There is no obvious choice at present between the three alternatives: all have their strong and weak points.

  - The path selected should be one that maps best against the corporate environment, IS capability, and application needs.

  - M-M applications have the greatest scope for improvement. At least potentially, M-M applications could be superior to either of its parents.

VI

VI RECOMMENDATIONS

- o These recommendations are divided into three categories:
  - Technical approaches.
  - End-user relationship building.
  - Vendor partnerships.

A. TECHNICAL APPROACHES

1. LOW RISK: DATA DOWNLOADING

a. An Entry Strategy

- o IS should select an important, but technically unambitious, user area that:
  - Uses a significant number of standalone PCs.
  - Rekeys corporate data.
  - Uses data from a software vendor product that has a proprietary downloader.
- o IS should ascertain that the department has at least a moderate amount of interest and commitment to downloading data.

- o If all these requirements are met, then IS should:
  - Analyze the data needed.
  - Provide an extract file.
  - Set up inquiry and/or scheduled downloading.
- o At every step, IS should carefully explain what is and is not possible using this approach.
- o This approach will begin serious M-M work in a controlled environment. With successes behind it, any caution that IS ~~exhibits~~ shows toward more ambitious and technically demanding M-M projects will be better accepted.

b. Standards

- o Ironically, standard setting, if done too early, could be a high-risk alternative since IS departments would then be locked into obsolescent technology.
- o Since there are currently no obvious product winners from a technological standpoint and since there will be a next generation of products soon, standard setting should be limited; that is:
  - The number of current M-M link products used should be kept at a reasonable number (a maximum, say, of four to six).
  - Where there is a significant investment in proprietary software (e.g., from MSA, Cullinet, McCormack & Dodge), that vendor's link package should be used if there is user demand for that data.
  - Implementations should be relatively inexpensive and reversible. The more an application is bound to a current vendor's technology and the more important the application, the more difficult it will be to change direction. (This is, of course, the vendor's objective.)

c. The Information Center As a Connectivity Tool

- In many people's minds the Information Center has gone into a shadow as a result of the advance of PCs. It may also be eclipsed by M-M linkages.

- Looking back, one sees that much of the problem is caused by the relatively low level of support and user friendliness in many Information Centers. Partly, this was a historical accident in that many Information Centers were established at the start of the recent recession, and they were starved for funds.

- At least as an interim step, the Information Center has a role to play as a staging area for extracted files that can be downloaded. For later implementation of M-M applications, the Information Center will be bypassed where production data files are used.

2. LOW/MEDIUM RISK: DEVELOPING AN ON-LINE BATCH STRATEGY

- IS departments developing an on-line batch strategy must steer a careful course.

  - The micro must be sufficiently isolated from the host system so that input and output can be viewed essentially as file transfers, even if the data transfers are very short and frequent--i.e., transactions, as shown in Exhibit VI-1.

  - On the other hand, if the micro system becomes too isolated, essential central coordination and control is absent.

  - Exhibit VI-2 shows a conceptual micro applications post-processor that would be interposed between the micro application and data base and the central data base.

- This kind of post-processor will help to close the gap that will arise between processing steps at the micro level that are recognized as host transactions

and other host data base changes that are not normally host system transactions.

- Developing such interface procedures will be necessary in order to meet the "next-generation" M-M applications described in the case studies in Chapter III.

3. HIGH RISK: INTERACTIVE APPLICATIONS

- Interactive applications ~~should be in the short- and~~ medium-term (~~one to~~ three years), although it will almost certainly be much longer before they are routinely used.
- Section C of this chapter describes strategies for working with vendors. Such partnerships would reduce the risk and allow for implementation of interactive applications sooner.

B. END-USER RELATIONSHIP BUILDING

- Because of the nature of M-M applications, much of the activity will have to ~~go on~~ at user locations. This makes the quality of the relationship between end users and IS important. Executive-level relationships will generally be even more important. The areas that should receive focus include:

  - Improving relationships generally.
  - Improving PC-related services.
  - Changing the IS organization.

1. GENERAL IS-USER RELATIONSHIP IMPROVEMENTS

- It is beyond the scope of this report to review all the things that could be done to improve IS-user relationships.

- Most of the findings and recommendations in INPUT's 1982 report, Evaluating the EDP Level of Service, are still valid (and unfortunately are needed in almost as many organizations as before).

- Several key points from the report earlier are reprinted here in Appendix D for readers' convenience.

o It is especially important that end users have confidence in IS's good intentions and knowledge when IS provides advice on M-M issues. Policies to achieve this include:

  - Regular meetings with key user staff.

  - Frankness on issues and problems; unnecessary jargon should be avoided.

  - Semi-technical briefings on IS issues in general and M-M issues in particular.

  - A "marketing" approach to IS service by IS (complete with "marketing reps" if resources are available).

  - Keeping a "book" on key operations units to understand what motivates their systems requirements. Business planning documents are useful, but personal contact is even more useful.

2. PC SERVICES

o Much existing IS PC support is inadequate in terms of quality, quantity, and coverage. However, it is even more critical now to provide this support than it was in the past.

  - PC support was the subject of a 1982 INPUT study, Supporting Personal Computer Software. The recommendations given in the report of that study are still valid; consequently, all the attributes of PC support will not be detailed here.

- A summary of these earlier recommendations is contained in Appendix E.

E

o The PC support function is more important than before for two reasons:

  - The more that users (and IS) are educated on the true capabilities of micros, the less likely they are to go chasing after impossible and/or dangerous M-M applications.

  - The PC support function, reporting to IS, can provide an excellent early warning system for users' M-M intentions.

    . IS can work with users to ~~make~~ construct M-M systems that all sides can live with.

    . At the least, IS has more time to head off poorly considered initiatives, mobilizing countervailing forces if need be.

3. ORGANIZATIONAL CHANGES

o Many IS organizations are considering, and some have implemented, a partial or full decentralization of their application-related functions.

  - At the least, this can take the form of physical decentralization, with the units still reporting to IS, as shown in Exhibit VI-3.

VI-3

  - M-M applications can add another dimension to this, as shown in Exhibit VI-4.

VI-4

    . Some of the physically decentralized units can become organizationally decentralized also.

    . Corporations may wish to experiment with both approaches to see which works best; i.e., should the organization structure be skewed more to the "micro" or to the "mainframe"?

  - The exact arrangements will vary depending on such factors as:

- The corporate culture.
- User-IS relations.
- Amount of technical complexity of systems in the corporation.
- Size of decentralized units.
- Amount of strategic business unit (SBU) application independence.
- SBU willingness/ability to manage a technical function.

o Ultimately, the IS-related organization could evolve into something similar to that in Exhibit VI-5.

VI-5

C. VENDOR PARTNERSHIPS

o One of the findings in Chapter III was that the adequacy of technical M-M arrangements is one of the chief determinants of M-M application success.

- A key finding in Chapter IV was that interactive, shared-functionality M-M applications were a goal for most organizations.
- Unfortunately, the discussion in Chapter V indicated that this sort of application will not be technically feasible for some time to come.

o While on-line batch systems will often be effective, they will not always satisfy minimal user requirements (for example, in a securities- or currency-trading environment) and will often ultimately leave many users somewhat dissatisfied.

- Vendors live by satisfying users. Consequently, large IS organizations would do well to enter into cooperative arrangements with one or more vendors to find technical M-M solutions that work in a real organization.

  - IS would contribute:

    . A test bed.

    . Machine time.

    . Business and systems analysts.

    . Technical support and assistance.

  - The vendor(s) would contribute:

    . Technical expertise.

    . Advice on workable/unworkable alternatives.

    . Product prototypes.

- Corporations could stay at the leading edge technically while solving real business problems. There would have to be some limits on the relationship.

  - IS (and individual staff members) would have to adhere to reasonable vendor requirements to maintain security on what, after all, could be a valuable product.

  - There would have to be a "no raiding" agreement on each other's personnel.

- Both small and large vendors have their attractions.

  - Large vendors have more products and a larger market share. Often there may be a pre-existing relationship between IS and a vendor to build on.

- Smaller vendors may be more innovative and "hungrier"; they may, however, be almost paranoid about secrecy.

o Research partnerships that work out well could result in a more permanent business arrangement, including:

  - Corporate IS playing a more active role in product development.

  - The corporation and/or IS taking a stake in promising companies.

Corrections in Appendix A to do not show in final. I understand WP chose not to correct.
-rk 7/18

Appp. A

CATALOG NO. UEPM[ ][ ]

MICRO-MAINFRAME USER QUESTIONNAIRE

INPUT is conducting a study on the issues involved in linking microcomputer host systems and data. We will make recommendations on how corporations can best deal with these issues in the coming years. We would like your organization to take part in this study by describing what you are doing now, what your plans are and what problems you see. This information will be used by IS departments in their planning and will also be used by a wide variety of information service vendors to offer more useful products and services.

None of the information that you provide will be associated with your company. In return for your taking part in this study, we will send you a summary of this study on its completion and will also send you a summary of INPUT's report, PC Software Support in Large Corporations.

1. How many personal computers are in use within your company? (If no PCs are used or planned by the end of 1985, end interview.)

	Now	End of 1984	End of 1985
Total all types	_____	_____	_____
IBM PC XT/370 or 3270/PC	_____	_____	_____
IBM PC except XT/370 or 3270/PC and IBM PC SW/data-compatible types	_____	_____	_____
UNIX-based systems	_____	_____	_____
Other personal computer types	_____	_____	_____

(Total should equal sum of parts)

2a. How will the UNIX-based systems be used? _____

_____

2b. In the future, how important do you see UNIX-based systems being to your organization's plans? (1 = low importance, 5 = high importance)

UNIX-based systems _____

Why? _____

_____

3a. In the long run, how important ~~do you see~~ the XT/370 in your organization's plans? (1 = low importance, 5 = high importance)

XT/370 _____

Why? _____

_____

The 3270/PC? _____

Why? _____

_____

3b. How well would you rate your organization's current understanding of the capabilities of the XT/370 and the 3270/PC? (1 = low degree of understanding, 5 = high degree of understanding)

XT/370 _____ 3270/PC _____

Please give me some examples of particular areas where your organization requires additional information on the capabilities of the XT/370 and the 3270/PC. (PROMPT AS NECESSARY: for example, what has to be done to permit current applications software to run on the XT/370, how will concurrent data bases be handled, etc.)

XT/370 _____

_____

_____

3270/PC _____

_____

_____

4a. How many multiuser microcomputer systems (e.g., Altos) and local area networks (LANs) do you now have installed? Who are the vendors? What are these systems being used for?

	Multiuser Micros	LANs
Number of installations	_____	_____
Vendors	_____	_____
Applications/Uses	_____	_____

4b. How many multiuser micros and local area networks do you expect to have installed in two years? What new uses will you have?

	Multiuser Micros	LANs
Number of installations		
Vendors		
Applications/Uses		

5. In the future, what will the relative importance be to your organization of the following kinds of microcomputers? (1 = low importance, 5 = high importance) Why? (READ EACH ITEM BELOW)

	Rating	Reason Why
Standalone personal computers running personal computer software? (e.g., IBM PC/XT)		
Standalone personal computers running mainframe software?		
Personal computers in local area networks?		
Mainframe terminals that also have personal computer capabilities (e.g., 3270/PC)		

6. On a scale of 1 to 5 with 1 representing low importance and 5 representing high importance, how would you rate the following functional areas? In two years how would your importance rating change for these? Why the change?

	Now	Two Years	Reason for Change
Spreadsheet packages using local data			
Spreadsheet packages using downloaded data			
Vendor application packages for PCs			
In-house developed programs for PCs (including fourth generation languages)			

7a. The next set of questions relate to so-called micro-mainframe application systems. For the purposes of this study, we are defining this to mean the following: "Applications in which neither the mainframe host nor a microcomputer can fully carry out an activity without utilizing processing capabilities or data from the other." Do you agree with this definition?

☐ Yes ☐ No

7b. If no, please tell me how you would modify it: _____

8. With +5 representing agreement and -5 representing disagreement, to what extent do you agree that "Within three to five years most applications that are now host-based will have a considerable amount of functionality taken over by personal computers that are linked to the host." _____

Why? _____

_____

_____

9. Do you believe that links between host computers and micros will be predominantly interactive, predominately on-line batch, or about the same? (READ DEFINITION IF NEEDED)

DEFINITION: ON-LINE BATCH - where the micro performs processing on a standalone basis and, periodically, the personal computer and the host exchange data; the host may then further process the data received.

☐ Predominantly interactive

☐ Predominantly on-line batch

☐ About the same

Reason why _____

_____

10. In constructing micro-mainframe systems how common do you think each of the following approaches will be? (READ LIST BELOW) Why? (1 = very common, 5 = not common) NOTE: ALL OPTIONS MAY BE RATED "NOT COMMON" OR "VERY COMMON" - OPTIONS ARE NOT MUTUALLY EXCLUSIVE.

	Rating	Reason Why
Modification of existing software	_____	_____
		_____
Use existing data base but write new application code	_____	_____
		_____
Write entirely new applications	_____	_____
		_____

11a. Generally, to what extent do you see data base linkage and synchronization as a serious problem in establishing micro-mainframe links? (1 = not a problem, 5 = a serious problem) _____

11b. How serious is this problem for systems used for analysis? (e.g., spreadsheets) _____

Why? _____

_____

11c. How serious is this problem for production systems? (e.g., order entry, payroll) _____

Why? _____

_____

11d. What can an organization like yours do to solve these kinds of data base linkage and synchronization problems?

_____

_____

12a. Do you see backup and security as significant barriers to expanded use of linked micro-mainframe applications?

☐ Yes ☐ No If no, skip to question 13.

12b. What are the major problems that you see? _____

_____

12c. What can an organization like yours do to solve these problems?

_____

_____

12d. What solutions can vendors provide? _____

_____

13a. For your own organization, what specific applications do you see as being the most suitable as micro-mainframe applications? (They need not be computerized applications now.) (Use workspace below.)

13b. Are these applications planned and if so, at what stage ~~are you in~~ implementing ~~them~~. (i.e., do not have concrete plans, are in the planning stage, applications are being developed, applications are already implemented)? (Use workspace below.)

13c. Do you expect to develop these applications in-house, purchase an existing package from an outside vendor, or modify in-house an existing package? (Use workspace below.)

Application Name	Stage				Source		
	None	Plan	Dev.	Imp.	In-house	Vendor	Both
1.							
2.							
3.							
4.							
5.							

Comments:

1. _____
2. _____
3. _____
4. _____
5. _____

14a. Do you have electronic mail? ☐ Yes ☐ No
If no, skip to question 15.

14b. How many users currently use the electronic mail now? In two years?

Now _____ Total in two years _____

14c. On the average, how many messages are now sent via electronic mail per month? In two years?

Now _____ Total in two years _____

14d. What percentage of this change in electronic mail use do you expect to be attributable to microcomputers? _____%

15a. In what ways do you see micro-mainframe applications increasing your data communications requirements?

_____

_____

15b. In what ways do you see micro-mainframe applications decreasing your data communications requirements?

_____

_____

15c. Overall, do you think that the net effect will be to increase or decrease your data communications requirements? By what percent?

Increase: _____% Decrease: _____% No effect: _____

16a. With 1 representing low importance and 5 representing high importance, how important will it be for your company's micros to communicate with micros in other departments?

_____

Why? _____

_____

16b. What type of communication facility will your firm be likely to use for this type of communication? (Use matrix on following page.)

_____

_____

17a. With 1 representing low importance and 5 representing high importance, how important will it be for your company's micros to communicate with mainframes in other companies (i.e., suppliers, customer)?

_____

Why? _____

_____

17b. What types of communication facilities will your firm be likely to use for this type of communication? (Use workspace on following page.)

_____

_____

18a. With 1 representing low importance and 5 representing high importance, how important will it be for your company's micros to communicate with public data bases? _____

Why? _____

_____

18b. What types of communication facilities will your firm be likely to use for this type of communication? (Use workspace below.)

_____

_____

Type of Communication Facility	Micros in Other Departments	Mainframes in Other Companies	Public Data Bases
LAN			
Existing network			
Leased lines			
WATS			
Dial-up			
Public data network			
Other			

19a. Do you expect your company's micros to be linked to more than one type of mainframe (e.g., IBM and DEC)? ☐ Yes ☐ No
If no, skip to question 20.

19b. What would be the most common types of mainframe linkages?

_____

_____

19c. Would, typically, the same micro have to link to more than one kind of mainframe at different times? ☐ Yes ☐ No

20a. Do you expect that your company's micros will have to be linked to more than one type teleprocessing environment (e.g., to both TSO and CMS, or to CICS and IMS DC)? ☐ Yes ☐ No

If yes:

20b. Which ones? _____

_____

20c. Would, typically the same micro have to link to more than one kind of software environment at different times? ☐ Yes ☐ No

21a. Do you expect that your company's micros will be linked to more than one type of data base management system (e.g., to both IMS and IDMS)? ☐ Yes ☐ No

If yes:

21b. Which ones? _____

_____

21c. Would, typically, the same micro have to link to more than one kind of DBMS at different times? ☐ Yes ☐ No

22a. Do you expect microcomputer use in your company to accelerate the use of relational data base systems in your company? ☐ Yes ☐ No

If no, skip to question 23.

22b. Which one? _____

_____

22c. Would this data base be located on a regular mainframe ☐ or have a special machine ☐ devoted to it? IF SPECIAL MACHINE: Which one?

_____

_____

23a. With 1 representing no assistance and 5 representing much assistance, how much assistance generally do you expect to be able to get from vendors in helping with planning and implementing your organization's critical micro-mainframe applications? _____

23b. More specifically, how would you rate:

Vendor Type	Rating	Reason Why
Microcomputer hardware vendors	_____	_____
IBM	_____	_____
Software vendors who primarily offer mainframe software	_____	_____
Software vendors who offer both mainframe and microcomputer software	_____	_____
Remote processing (timesharing) vendors (e.g., McAuto, Boeing Computer Services)	_____	_____
Integrated systems (turnkey) vendors	_____	_____
Professional services and consulting firms	_____	_____

24. What current problems do you see micro-mainframe systems solving or alleviating?

_____

_____

25a. What problems do you see being created or aggravated by micro-mainframe systems?

_____

_____

25b. How do you think these new problems should be dealt with?

_____

_____

THANK YOU.

App. B

This is still missing
I need it now! Thanks

Appendix B: Corporate Respondent Profile

- The 78 corporate respondents were in the following industrial sectors:
  - ~~Discrete manufacturing : 16~~
  - Process manufacturing : 26
  - Banking & Finance : 18
  - ~~Insurance~~ Discrete manufacturing : 16
  - Services : 11
  - Insurance : 7
- Large corporations (i.e, revenues of over $2 billion) accounted for 42 of the respondents. Smaller organizations (revenues between $500 million and $2 billion) had 36 of the respondents.
- As noted in the body of the report, there were generally few ~~significant differences in~~ differences that were correlated with respondent characteristics ~~due to~~ correlated with industry sector or company size.

Appp. C

CATALOG NO. UEPM [ ]

MICRO-MAINFRAME VENDOR QUESTIONNAIRE

INPUT is conducting a study on the issues involved in linking microcomputer host systems and data. We will make market forecasts on related products and services. We would like your organization to take part in this study by describing what you are doing now, what your plans are, and what problems you see. This information will be used by IS departments in their planning also.

None of the information that you provide will be associated with your company unless you wish otherwise. In return for your taking part in this study, we will send you a summary of this study on its completion and will also send you a summary of INPUT's report, PC Software Support in Large Corporations.

1. Which microcomputer hardware and software environments in the following list does your company expect to be important for micro-mainframe applications in 1984 and in 1986? (1 = low importance, 5 = high importance) Why?

	End of 1984	End of 1986	Reasons
IBM PC AND PC/XT	___	___	_____
IBM XT/370	___	___	_____
IBM 3270/PC	___	___	_____
UNIX-based products	___	___	_____
Other micro hardware (describe)	___	___	_____
Other micro software (describe)	___	___	_____

2. What do you see as the major opportunity areas in connection with the XT/370 and the 3270/PC?

XT/370 _____

_____

3270/PC _____

_____

What do you see as limiting the growth in supplying software specifically aimed at the XT/370 and 3270/PC?

_____

3. In the future, what will the relative importance be of the following kinds of microcomputers? (1 = low importance, 5 = high importance) Why? (READ EACH ITEM BELOW)

	Rating	Reason Why
Standalone personal computers running personal computer software? (e.g., IBM PC/XT)	_____	_____
Standalone personal computers running mainframe software? (e.g., XT/370)	_____	_____
Personal computers in local area networks?	_____	_____
Mainframe terminals that also have personal computer capabilities (e.g., 3270/PC)	_____	_____

4. On a scale of 1 to 5, with 1 representing low importance to corporate users and 5 representing high importance, how would you rate the following functional areas? In two years how would your importance rating change for these? Why the change?

	Now	Two Years	Reason for Change
Spreadsheet packages using local data	_____	_____	_____
Spreadsheet packages using downloaded data	_____	_____	_____
Vendor application packages for PCs	_____	_____	_____
In-house developed programs for PCs (including fourth-generation languages)	_____	_____	_____

5. The next set of questions relates to so-called micro-mainframe application systems. For the purposes of this study, we are defining this to mean the following: "Applications in which neither the mainframe host nor a microcomputer can fully carry out an activity without utilizing processing capabilities or data from the other." Do you agree with this definition?

☐ Yes ☐ No

If no, please tell how you would modify it: _____

_____

6. With 1 representing agreement and 5 representing disagreement, to what extent do you agree that "Within three to five years most applications that are now host-based will have a considerable amount of functionality taken over by personal computers that are linked to the host?" _____

Why? _____

_____

7a. Do you believe that links between host computers and micros will be predominantly interactive, predominantly on-line batch, or about the same? (READ DEFINITION IF NEEDED)

DEFINITION: ON-LINE BATCH - where the micro performs processing on a standalone basis and, periodically, the personal computer and the host exchange data; the host may then further process the data received.

☐ Predominantly interactive

☐ Predominantly on-line batch

☐ About the same

Reason why: _____

_____

7b. How is your firm addressing this issue?

_____

_____

7c. How does this compare to other specific products?

_____

_____

8a. In constructing micro-mainframe systems how common do you think each of the following approaches will be? (READ LIST BELOW) Why? (1 = very common, 5 = not common) NOTE: ALL OPTIONS MAY BE RATED "NOT COMMON" OR "VERY COMMON" - OPTIONS ARE NOT MUTUALLY EXCLUSIVE.

	Rating	Reason Why
Modification of existing software	_____	_____
Use existing data base but write new application code	_____	_____
Write entirely new applications	_____	_____

8b. How is your firm addressing this issue? _____

8c. How does this compare to other specific products? _____

9a. Generally, to what extent do you see data base linkage and synchronization as a serious problem in establishing micro-mainframe links? (1 = not a problem, 5 = a serious problem) _____

9b. How serious is this problem for systems used for analysis (e.g., spreadsheets)? _____

Why? _____

9c. How serious is this problem for production systems (e.g., order entry, payroll)? _____

Why? _____

9d. What do you see as the general solution to this problem? _____

9e. How are you addressing it? _____

_____

10a. Do you see backup and security as significant barriers to expanded use of linked micro-mainframe applications?

☐ Yes ☐ No If no, skip to question 13.

What are the major problems that you see? _____

_____

_____

10b. What do you see as the general solutions to these problems?

_____

_____

10c. How are you addressing it? _____

_____

11a. What specific applications do you see as being the most suitable as micro-mainframe applications? (They need not be computerized applications now.) (Use workspace below.)

11b. Are products for these applications planned, and, if so, at what stage are you in implementing them? (i.e., do not have concrete plans, are in the planning stage, applications are being developed, applications are already implemented)? (Use workspace below.)

11c. Do you expect users to develop these applications in-house, purchase an existing package from an outside vendor, or modify in-house an existing package? (Use workspace below.)

Application Name	Stage				Source		
	None	Plan	Dev.	Imp.	In-house	Vendor	Both
1.							
2.							
3.							
4.							
5.							

Comments:

1. _____

2. _____

3. _____

4. _____

5. _____

12a. In what ways do you see micro-mainframe applications increasing data communications requirements?

_____

_____

12b. In what ways do you see micro-mainframe applications decreasing data communications requirements?

_____

12c. Overall, do you think the net effect will be to increase or decrease data communications requirements? By what percent?

Increase: _____% Decrease: _____% No effect: _____%

13a. With 1 representing low importance and 5 representing high importance, how important will it be for a company's micros to communicate with micros in other departments? _____

Why? _____

_____

13b. What type of communication facility will a firm be likely to use for this type of communication? (Use workspace below.)

_____

_____

14a. With 1 representing low importance and 5 representing high importance, how important will it be for a company's micros to communicate with mainframes in other companies (i.e., suppliers, customer)? _____

Why? _____

_____

14b. What types of communication facilities will a firm be likely to use for this type of communication? (Use workspace below.)

15a. With 1 representing low importance and 5 representing high importance, how important will it be for a company's micros to communicate with public data bases? _____

Why? _____

_____

15b. What types of communication facilities will a firm be likely to use for this type of communication? (Use workspace below.)

Type of Communication Facility	Micros in Other Departments	Mainframes in Other Companies	Public Data Bases
LAN			
Existing network			
Leased lines			
WATS			
Dial-up			
Public data network			
Other			

16a. Do you expect a company's micros to be linked to more than one type of mainframe (e.g., IBM and DEC)?

☐ Yes ☐ No If no, skip to question 17.

16b. What would be the most common types of mainframe linkages?

_____

main

_____

16c. Would, typically, the same micro have to link to more than one kind of ~~man~~frame at different times?

☐ Yes ☐ No

16d. Which of your products will facilitate this?

_____

17a. Do you expect that a company's micros will be linked to more than one type teleprocessing environment (e.g., to both TSO and CMS, or to CICS and IMS DC)?

☐ Yes ☐ No If yes:

17b. Which ones? _____

_____

17c. Would, typically, the same micro have to link to more than one kind of software environment at different times?

☐ Yes ☐ No

17d. Which of your products will facilitate this?

18a. Do you expect that a company's micros will be linked to more than one type of data base management system (e.g., to both IMS and IDMS)?

☐ Yes ☐ No If yes:

18b. Which ones? _____

_____

18c. Would, typically, the same micro have to link to more than one kind of DBMS at different times?

☐ Yes ☐ No

18d. Which of your products will facilitate this?

19a. Do you expect microcomputer use in a company to accelerate the use of relational data base systems in a company?

☐ Yes ☐ No If no, skip to question 20.

19b. Which one? _____

_____

19c. Would this data base be located on a regular mainframe ☐ or have a special machine ☐ devoted to it? IF SPECIAL MACHINE: Which one?

_____

_____

19d. Which of your products will facilitate this?

_____

20a. What other products have you introduced or planned to introduce that will address micro-mainframe issues?

_____

20b. What functions will they perform?

_____

20c. What hardware and software environments will they function in?

_____

20d. When will they be available?

_____

20e. What competitive products will they most closely compete with? What will distinguish your product from the competition?

_____

_____

21. What current problems do you see micro-mainframe systems solving or alleviating?

_____

_____

22. What problems do you see being created or aggravated by micro-mainframe systems?

23. How do you think these new problems should be dealt with?

24. Can you provide technical descriptive material about the products discussed?

☐ Yes ☐ No

Appx. D

APPENDIX D: EXCERPTS FROM INPUT'S REPORT, EVALUATING THE EDP LEVEL OF SERVICE

A. GENERAL RECOMMENDATIONS

- Chargeback systems should be viewed as, at best, a cost-accounting tool. Periodically, such data should be used as an input to determine the cost of process or product.

- If chargeback systems are to carry out this limited function, the costing mechanisms must be greatly expanded:

  - All costs, not just hardware costs, should be tracked.

  - Software maintenance costs, especially, should be tracked by project and user. This is rarely done now.

  - Costs should be based on resources denied, not resources consumed.

- IS management should strongly distrust what it believes user satisfaction to be in the absence of objective, rigorously obtained information.

- Surveys and other attempts by IS to gain such knowledge can lead to frustration by both IS and users:

  - This is true for IS, because user "satisfaction" can prove to be elusive and mercurial, seemingly reflecting last week's triumph or crisis.

- Users, on the other hand, can view such well-meaning surveys as goads ~~which~~ that remind them of the poor service they believe they are receiving.

o Similar efforts to improve communication will often only make it easier for each side to abuse the other.

o IS should resolve these and a number of related problems, by recognizing that user expectations and IS performance should be linked. Too often the two exist, at best, in separate vacuums and, all too often, are not consciously examined.

o After examining current practice and problems, INPUT believes an initiative that would usefully serve many organizations is the "user contract," or as INPUT prefers to describe it, the "user service agreement."

o User agreements, if executed successfully, establish common standards against which performance can then be monitored.

  - This sets up the dialogue that users desire.

  - IS gets its chance to "educate" users.

  - Expectations can often be influenced and managed by IS.

  - A joint measuring process is established.

  - Regular reports and meetings provide early warning of changing needs and objectives.

o The next section is devoted to exploring the opportunities inherent in service agreements.

B. USER SERVICE AGREEMENTS

- There are four aspects to implementing user service agreements ("user contracts") in an organization:
  - Deciding whether service agreements are, in fact, suitable for a particular organization.
  - Defining the agreements' contents.
  - Establishing the initial service agreements.
  - Ensuring that IS has the resources to support the process.
- Each of these points will be discussed in this section.

1. DECIDING WHERE SERVICE AGREEMENTS ARE ADVISABLE

- Some organizations are bad bets for introducing service agreements. Examples include environments where:
  - Basic corporate policies are in a constant state of flux.
    - If the corporation cannot answer the question, "Who am I?" then users in particular areas will have similar problems consistently enunciating their needs.
    - IS itself will also be buffeted in this sort of environment and will find it difficult to live up to its commitments.
  - User management turnover is high and/or user management is not strong or very political. Agreements cannot be built on sand.
  - The underlying business is subject to marked fluctuations that cannot be predicted or influenced by the organization. "Reaction" and "catch-up ball" are the watchwords. Agreements would not make much sense.

- This does not mean that an organization must be rigid and unchanging to benefit from service agreements. The best environment is one that is growing and dynamic.

- In addition, the corporate environment should be receptive to planning in general. The environment would be very favorable if past planning efforts resulted in bottom-line benefits that are widely perceived and accepted.

2. FACTORS DEPENDENT ON INFORMATION SYSTEMS

- Some of the critical factors for making service agreements work are dependent on the nature and capabilities within IS itself. It makes no sense to enter into agreements that IS stands little chance of fulfilling.

- For example, some "central" or "corporate" IS departments are staff, planning, or coordinative groups. They often do not have either the detailed operational knowledge or the means of allocating specific operational resources. This kind of group will find it difficult to avoid over- or under-committing resources. It will also find it difficult to make resource re-allocations.

- The capabilities of IS staff and computer resources must be candidly assessed.

  - Some IS organizations may be in a rebuilding phase. Taking on voluntary commitments that would result in more failure is not the way to nurse the patient back to health.

  - On the other hand, where IS management is new and has succeeded in making internal improvements, service agreements are a way of making the new state of affairs clear to the outside world.

- Finally, there are some specific capabilities that will be required to make the process work:

- Project and time-estimating skills will be important for IS to carry out its contractual responsibilities. An adequate system should be in place.

- Linked with estimating skills is the requirement to deal with performance measurement questions. As noted earlier, terminal uptime and response time are two of the most critical issues involved.

  . In many organizations, these measurements are performed incompletely or not at all.

  . It may be necessary to rely on user personnel for some measurements in these areas, in order to build trust and communication.

o Exhibit D-1 summarizes the effects of the organizational and IS factors that affect the advisability of introducing service agreements.

3. USER-RELATED FACTORS

o Service contracts will not serve a useful purpose if relations with a particular user are getting worse or are already bad.

- There is a minimum level of trust and confidence required to make such agreements work. If this is lacking, trying to introduce a new, unfamiliar issue will, at least, further complicate matters and, at worst, make the user think IS is trying to divert attention from existing, well-known problems.

- However, where relations are improving, even if they still are not very good, a service agreement can be further evidence of IS's commitment to improvement.

- There can sometimes be a thin line between these two situations, and it can be useful to initially introduce an intermediary (from either inside or outside the firm) to assess the situation objectively.

- o It is important that key users be distinguished from the average and limited users.

  - It is the key users who usually determine whether data processing will be successful in an organization and how much the use of the computer will contribute to the firm.

  - Key users are identified by a combination of:

    . The importance of the user department to the organization.

    . The proportion of IS resources (human and hardware) that the user department consumes.

  - Exhibit D-2 illustrates graphically the relationships between the three types of users--key users, average users, and limited users.

    . Generally, where a department consumes significant systems resources and/or the department is important to the company, the department will be a key user.

    . Note, however, that where there is a pairing of extremes (high consumption - low departmental importance, or vice-versa), the department is probably not a key user.

    . Some IS organizations may find that they in fact have few key users: their biggest customers are not very important in the totality of the organization. Missionary work, which may or may not involve service agreements, would certainly be indicated.

- o Knowledgeable, sophisticated users are certainly good candidates for user contracts.

  - Many of the definitional and expectation problems caused by more naive users will be absent.

- This kind of user often is also more involved with the IS department and data processing operations.

- Of course, they cannot be ignored so easily when things go wrong.

o Where users are increasing their use of services not supplied by IS, this can be a sign that a service agreement is needed so they receive the services they need.

- Sometimes users go outside for services that IS cannot supply at all (e.g., certain external information data bases) or that IS cannot do feasibly (e.g., a personal computer on every analyst's desk).

- However, sometimes users look elsewhere because they believe, rightly or wrongly, that IS cannot meet their needs. Drawing up an agreement with the user will, at the least, identify whether this is so.

o Finally, current user satisfaction as perceived by IS should not be a factor in deciding whether to establish service agreements. As shown earlier, IS is more likely to be wrong than right in this assessment.

o Exhibit D-3 summarizes the effects of these user-related factors that would affect the advisability of introducing service agreements.

4. SERVICE AGREEMENT CONTENTS

o Service agreements should focus on essentials. The following is not required:

- Complexity.

- Undue formality.

- Legalisms.

- Rigidity.

- o Service agreements could become extremely large, if every element of IS-user relationships were defined. In many cases this is not necessary. Where routine operations (e.g., batch financial systems) have been operating smoothly for many years, the adage "if it ain't broke, don't fix it" should be followed.

- o The areas that should be focused on are those areas that are new, critical, and/or have a significant problem potential. INPUT's research indicates that for many IS departments the critical areas will be:

  - Terminal downtime.

  - Response time.

  - Program development requests.

- o The exact issues to be dealt with will naturally vary from user to user, depending on user needs and the status of the application. However, there will be certain points that should at least be considered in every case. Exhibits D-4, D-5, and D-6 are checklists of items that should be considered for inclusion in every agreement.

- o User agreements should be viewed as flexible, open-ended documents with provision for modification by either side, based on changing conditions.

  - Again, a legalistic or buyer-seller state of mind should be avoided.

  - It is important that both sides be able to give as much warning as possible to the other when adverse conditions threaten. Otherwise, the tendency will be to hope for the best and postpone bad news as long as possible.

- o This raises a related question of whether chargeback rates should be included in the agreement.

- o One of the main advantages to using the term "service agreement" is avoiding the word "contracts," which implies a buyer-seller relationship.

  - Most IS operations are not set up in such a way that real money (or even reliable pseudo-money) changes hands.

  - As indicated earlier, most chargeback systems are, at best, accounting conventions. Unless the chargeback system is thought through at least as well as the user agreement is, it would be a mistake to associate the two in one package.

- o If charges are not included in the agreement, then what does IS get out of the agreement? Are promises being made, with nothing received in return? IS management should squarely face the fact that they are an internal service organization. All benefits are supposed to flow in one direction, hence: service agreement.

- o What IS management receives is:

  - A baseline on which to be judged.

  - A measurement process agreed to by key users.

  - A standardized process for being informed of changes in user activities.

5. DEVELOPING USER SERVICE AGREEMENTS

- o In most organizations there will be little initial pressure from users to establish data processing service agreements.

  - As indicated in the study findings, there is as yet little user awareness of the concept.

- o Consequently, IS can introduce user service agreements in a cautious, orderly process.

- Exhibit D-7 shows the typical steps that should be followed in developing user service agreements.

o Most of the steps have been discussed in previous sections:

- Make sure that top management and user managers understand the concept. It is important not to use the word "contract."

- Be prepared to be flexible and, within reason, to modify the form of agreements to meet user demands.

- Do not promise more than can be delivered.

6. INFORMATION SYSTEMS RESOURCES NEEDED

o Assuming that IS has made the correct choice in deciding to implement service agreements, the basic resources that IS needs to support the process will be in place.

o However, there will be some specialized skills and tools that will be of considerable assistance in making service agreements work. These include:

- Cost estimating.

- Performance measurement.

- Decision support systems.

- Rapid prototyping.

Appp. E

APPENDIX E: EXCERPTS FROM INPUT'S REPORT, SUPPORTING PERSONAL COMPUTER SOFTWARE

A. ORGANIZATIONAL SIZE IS A HIDDEN FACTOR IN THE PC SOFTWARE EXPERIENCE

- The size of the organization is an often-overlooked issue in PC support. The size has an impact on:
  - The number of PCs supported.
  - The attitude toward using outside vendors and services.
- The relative strength and motivating forces of PC use vary by organization size. Users acting alone are most significant in large companies because they have the size and resources to vividly affect PC campaigns. Small companies quite often go it alone because of the absence of central IS capability. User/vendor combinations are most prevalent in small and medium-sized companies, and the similarity in size of vendor and user organizations provides an acceptable as well as a comfortable working relationship.
- Personal computing use also can be categorized by organization size. Smaller companies often look to vendors for assistance in implementing customized systems. Larger companies can mobilize resources to build, maintain, and replicate systems effective for all applicable PC users, while in medium-sized companies there is a danger that custom software may be dependent on one person to operate and maintain it.

B. CATEGORIES OF PC SOFTWARE SUPPORT

- o Adequate standard setting and enforcement provide the foundation for PC software support.

- o The biggest issue for PC software selection is whether a particular application belongs on a PC. Alternatives to a PC include:

  - An information center.

  - A mainframe base.

  - A minicomputer-based turnkey.

  - A manual.

- o The most important contribution to effective use of PC software is education and training. Unfortunately it is the most neglected. Good documentation is also neglected. It is difficult to convince users to document their custom programs, especially when IS systems are not necessarily good examples.

- o Problem resolution is the central role of a support organization. Too often, however, PC software support is equated with problem resolution. The result is a support function relegated to "fire fighting." Problem resolution should be the backstop, not the frontline, of PC support.

C. THE GREATER THE I.S. RESOURCE, THE GREATER THE POTENTIAL BENEFIT

- o There are four levels of PC software support. In order of resource and expertise, they are:

- The foundation level.

- The commitment level.

- The full service support level.

- The leading-edge support level.

o It is usually advisable to implement one service level prior to the succeeding one.

o The foundation level represents the best price/performance level for most companies. This level requires a minimal amount of IS resource. Consulting services is the primary component of this level, and it establishes the framework for controlling PC software support.

o The leading edge can be the riskiest approach but can also provide the highest reward. In this support level, IS will design and implement a comprehensive set of PC applications. The main risk is that IS will not produce the right system or that users may not accept it. The reward is a comprehensive, efficient use of PCs throughout an organization.

D. DETERMINING THE LEVEL OF RESOURCE: AN ART OR A SCIENCE?

o There is no single formula for determining PC software support resource requirements. It is possible, however, to establish the order of magnitude within the problem. The major elements are related to user characteristics (i.e., the number of people who are direct hands-on PC users). More resources are required for a start-up operation as opposed to the "steady-state" of an already existing operation. Certain types of users, such as scientists, engineers, and frequent PC users, require less support.

o Other factors affecting the intensity of support demands are:

- Ultimate recipient of output (user as president).
- Source of data.
- Quality of software selection process.
- Software source.
- Extent of multivendor sources.
- Extent of user training.

o Taking all the above factors into account and using timesharing companies' support ratios as a guide, the ratio of PC support staff to end users will range from 1:50 to 1:300.

E. I.S. SHOULD BE THE PRIMARY SOURCE OF SUPPORT

o There are, potentially, many different sources of PC software support. A separate PC support unit in the IS department could provide support for every area. There are many other sources that also may be considered:

- IS department in general (no specialized group).
- Users.
- Computer stores.
- Hardware and software vendors.
- PC software consultants (external consultants).
- Training specialists (external or internal).

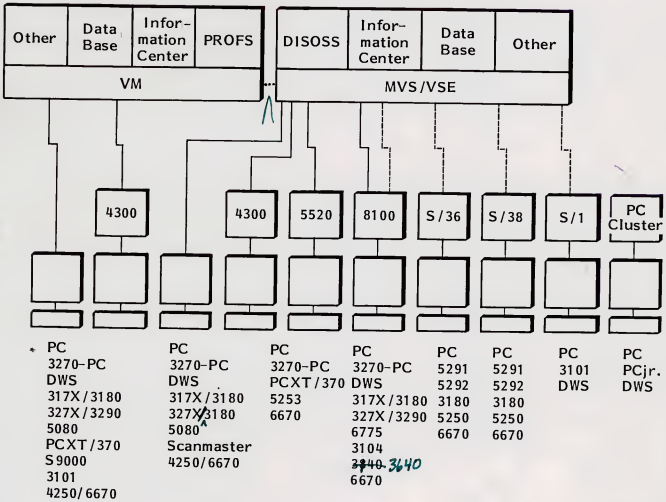
- It is difficult to make generalized statements since the availability and quality of stores and consultants vary, based on:
  - Geography.
  - PC hardware/software environment.
  - Application area.
- It is possible, however, to categorize these sources as being potentially primary or secondary assistance resources.

F. METHODS OF FINANCING PC SOFTWARE SUPPORT

- The key issue for providing PC software support is finding the financial resources. Too often inadequate support is spread among a wide range of functions because of improper financing. This kind of support can be worse than no support at all.
- Many IS departments assume that PC software support must be the same as a mainframe-based system; support is provided by in-house IS staff and is part of the overhead cost.
- Abdicating responsibility for support to the user will not solve the problem. The user is usually ill-equipped to support PC software. There are, however, other alternatives for financing support; these include:
  - Charging back support costs to users, either involuntarily or voluntarily.
  - "Bundled" services, where IS leases hardware, software, and support services to internal users.
  - Charging fees for individual support services.

EXHIBIT I-1

IBM'S PC COMMUNICATIONS FRAMEWORK



Source: IBM

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EXHIBIT I-2

CORPORATE MICRO GROWTH, 1984-1986

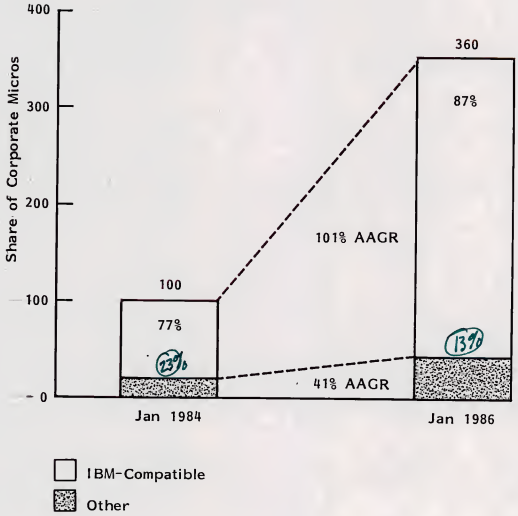

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EXHIBIT I-3

MICRO-MAINFRAME REPORT RELATIONSHIPS

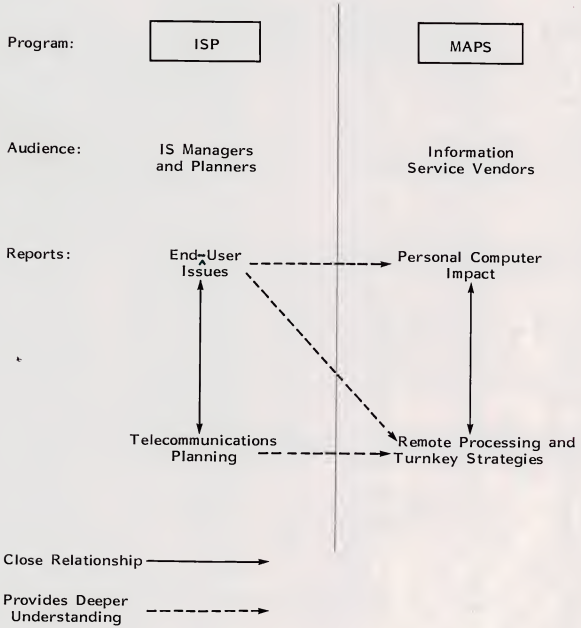

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EXHIBIT II-1

END USER AND IS MANAGEMENT VIEWS OF THE MICRO (1981)

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EXHIBIT II-2

END USER AND IS MANAGEMENT VIEWS OF MICRO-MAINFRAME LINKAGE (1984)

End Users

- Self-Determination
- Two-Way Data
- Operations and Analytic Use

IS Management

- Control
- One-Way Data
- Analytic Use

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EXHIBIT II-3

MICRO-MAINFRAME APPLICATIONS GROWTH: 1984-1988

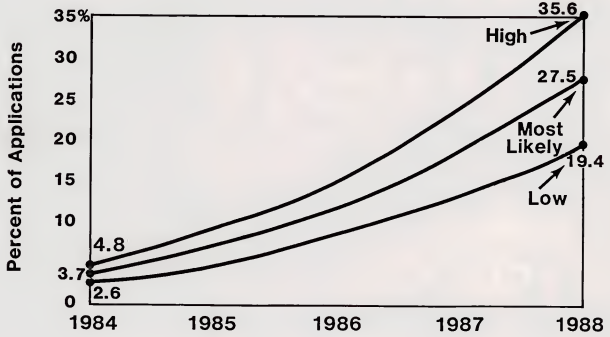

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EXHIBIT II-4

SHARED FUNCTIONALITY: THE GOAL AND THE CHALLENGE

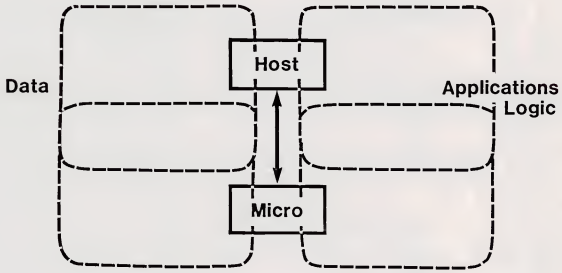

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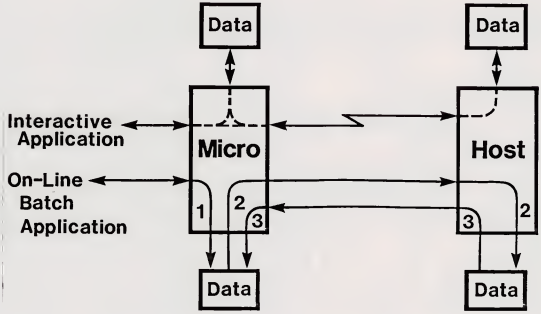
EXHIBIT II-5

CONNECTIVITY ALTERNATIVES



(Numerals refer to steps.)

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EXHIBIT II-6

MICRO-MAINFRAME DANGERS

- Data Base Linkages
- Security
- Loss of Flexibility
- User versus IS Control
- Design and Implementation Changes

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EXHIBIT II-7

RECOMMENDATIONS

- User-IS Relationships
  - IS: Business Orientation
  - Users: Knowledge and Confidence
- PC Support Unit
- IS Initiatives: Easy Projects
  - Experience
  - Confidence Building
- Consider Decentralization
- Experiment with Vendors

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EXHIBIT III-1

CENTRAL LOAN DATA BASE: MATRIXED WITH PCs

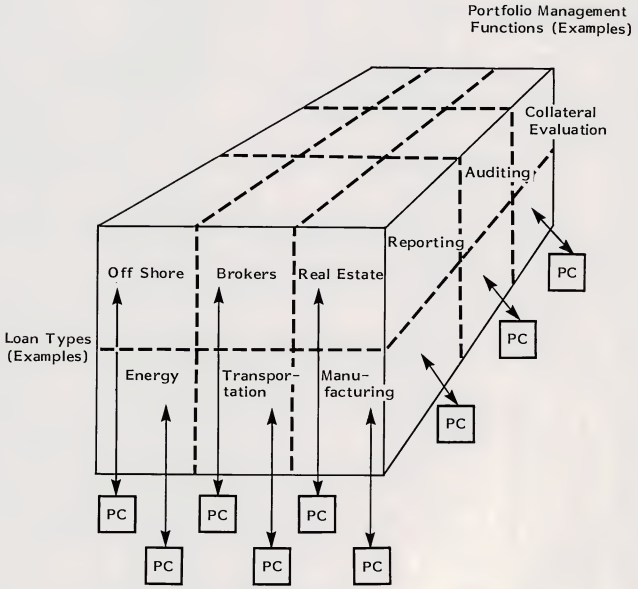

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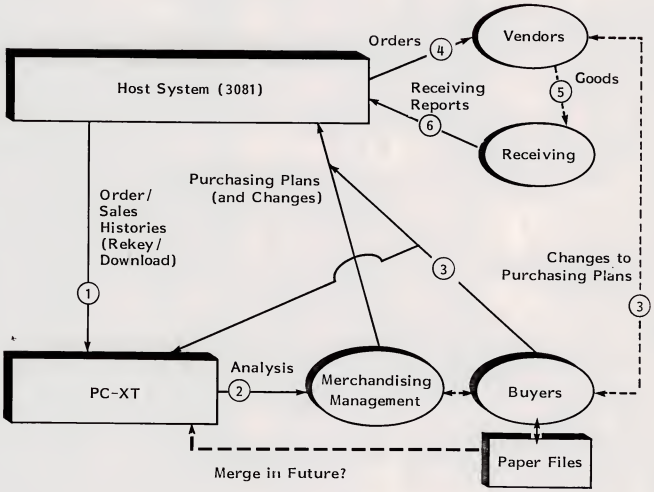
EXHIBIT III-2

SHIFTING OF CONTROL FROM MAINFRAME TO MICRO



Computer System Related Data Flows ————————

Human Communications ----------

Other Flows – – – – – – –

Numerals indicate processes

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EXHIBIT III-3

ORDER ENTRY APPLICATION COMPONENTS (LOGICAL VIEW)

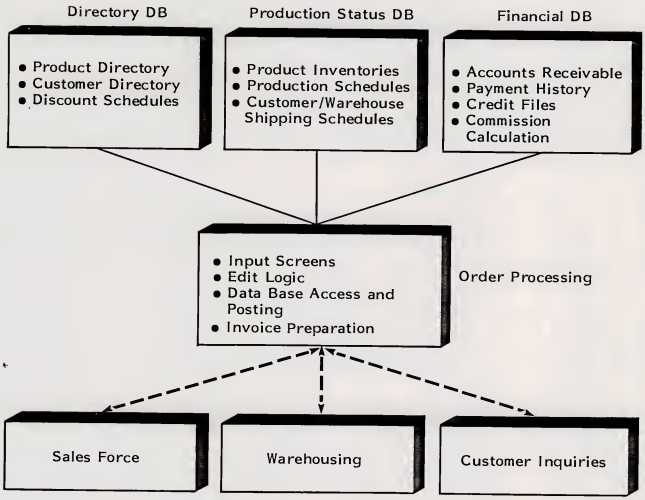

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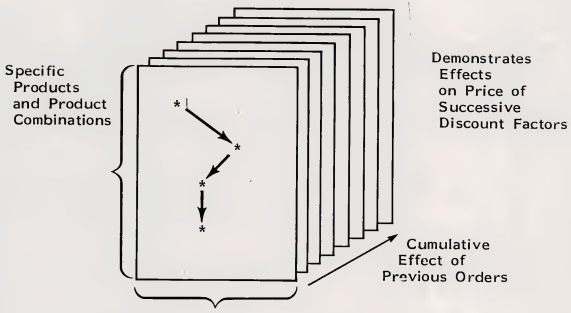
EXHIBIT III-4

CURRENT DISCOUNT STRUCTURE (Logical View):
PRINCIPAL DISCOUNT FACTORS



* Demonstrates Effects on Price of Successive Discount Factors

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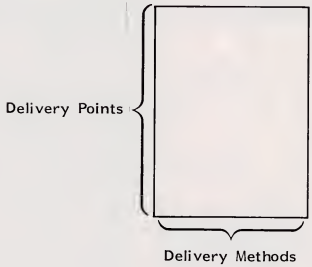
EXHIBIT III-5

CURRENT DISCOUNT STRUCTURE (Logical View):
OTHER DISCOUNT FACTORS



- Credit Factors
- Corporate Needs (Targets, Supply Costs)

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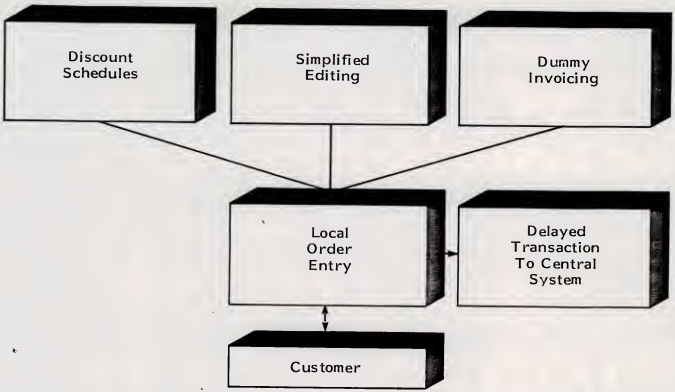
EXHIBIT III-6

DISTRIBUTED USER VIEW OF ORDER ENTRY APPLICATION



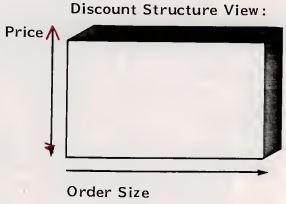


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EXHIBIT III-7

AN UNPLANNED EVOLUTION INTO A UNIX ENVIRONMENT

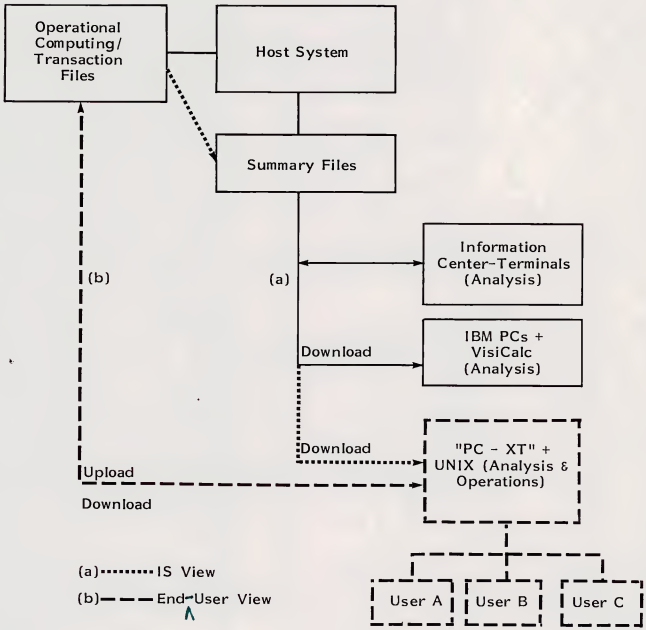

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EXHIBIT III-8

AN INSURANCE COMPANY'S MICRO-MAINFRAME NONCONNECTION

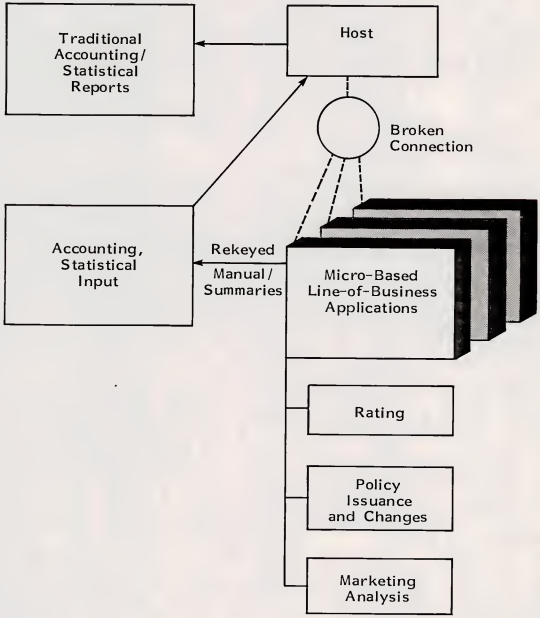

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EXHIBIT III-9

END-USER CASE STUDY SUMMARY

Case Study	User Satis-faction with IS	Micro Initiative from		Political/ Emotional Content	Technical Adequacy of Initiative	End-User		Probability of Initiative's Success	
		User	IS			Technical Under-standing	Commit-ment	Current	Future
Bank	High		X	Low	High	Medium	Medium	High	High
Retail	Low/ Medium	X		Low	Medium	Low/ Medium	High	Medium	Low
Order Entry (2)	Low	X		High	Low	Low	Medium	Low	Low
UNIX	Medium		X	Low	Medium	Low	Medium	Low/ Medium	Low
Insurer	Low	X		High	High	High	High	High	Medium/ High

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EXHIBIT III-10

DIFFERENCES BETWEEN ANALYTIC AND PRODUCTION SYSTEMS

FACTOR	ANALYTIC	PRODUCTION
Senior Personnel Initiate?	Yes	Not Usually
Senior Personnel Use?	Yes	No
Timeframe	Short	Medium to Long
Changes in Software Design/ Coding Assumed?	Yes	No
System Reused Regularly?	Sometimes	Usually
Model Oriented?	Yes	No
Off-the-Shelf Packages Usable?	Rarely	Usually
New Internal Data Elements Created?	Rarely	Often
External Data Required?	Often	Rarely

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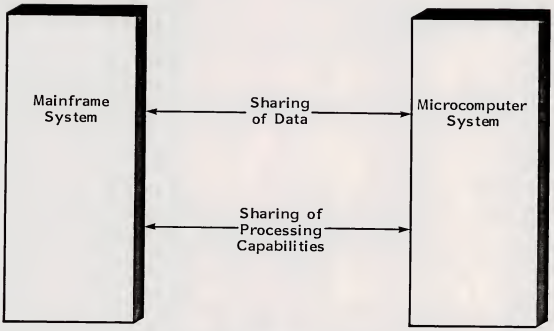
EXHIBIT IV-1

RESPONDENTS' VIEW OF SHARED FUNCTIONALITY



- 85% of respondents subscribe to this view of micro-mainframe applications.

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EXHIBIT IV-2

KEY IS MANAGERS' VIEW OF SHARED FUNCTIONALITY

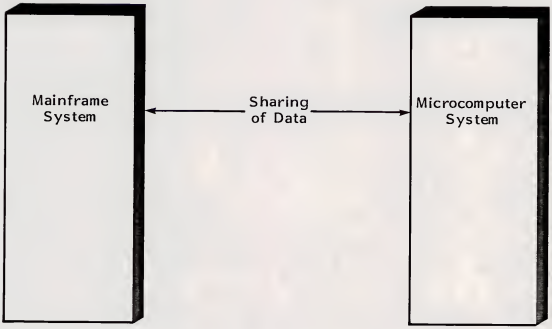

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EXHIBIT IV-3

EXPECTATION OF EXTENSIVE
HOST-MICRO SHARED APPLICATION FUNCTIONALITY

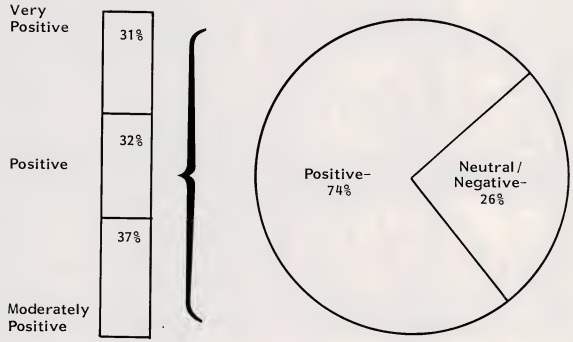

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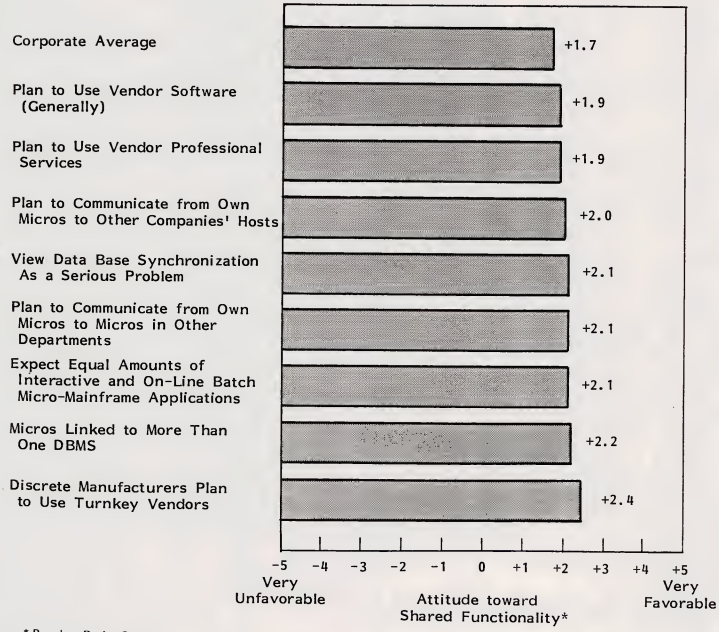
EXHIBIT IV-4

ATTITUDES TOWARD SHARED FUNCTIONALITY APPLICATIONS:
SELECTED GROUPS WITH HIGHER THAN AVERAGE ATTITUDES



* Based on Rating Scale

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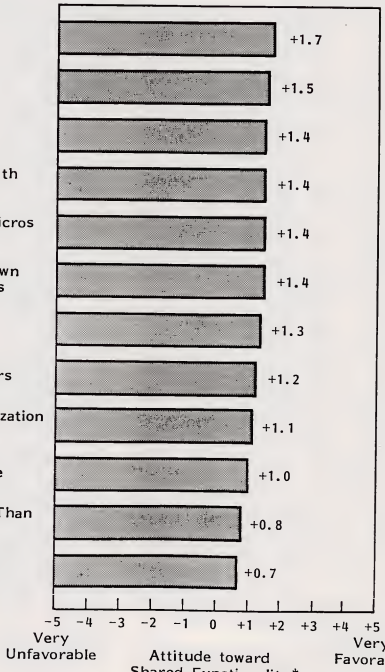
EXHIBIT IV-5

ATTITUDES TOWARD SHARED FUNCTIONALITY APPLICATIONS:
SELECTED GROUPS WITH LOWER THAN AVERAGE ATTITUDES



* Based on Rating Scale

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EXHIBIT IV-6

HIERARCHY OF MICRO-MAINFRAME CONNECTIVITY

1. Manual
   a. New Data
   b. Rekeyed Data

2. Downloading - Low Speed
   a. Extracts
   b. Operational Files

3. File Exchanges (Bidirectional)
   a. Low Speed, Proprietary Structure
   b. Low Speed, Generalized Structure
   c. High Speed, Proprietary Structure
   d. High Speed, Generalized Structure

4. Logical Data Bases Covering
   a. Multiple Physical Hardware Environments
   b. Multiple Software Environments

5. Segmented Applications Programs (Coordinated Processing Between Mainframe and Micro)
   a. Batch
   b. Interactive

Key: Darker Shades Indicate More Complex Issues/Unresolved Implementations

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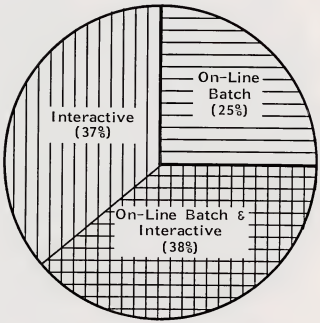
EXHIBIT IV-7

TYPES OF MICRO-MAINFRAME LINKAGES FORESEEN



Percent of Linkage Types

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EXHIBIT IV-8

MICRO-MAINFRAME LINKAGE ALTERNATIVES

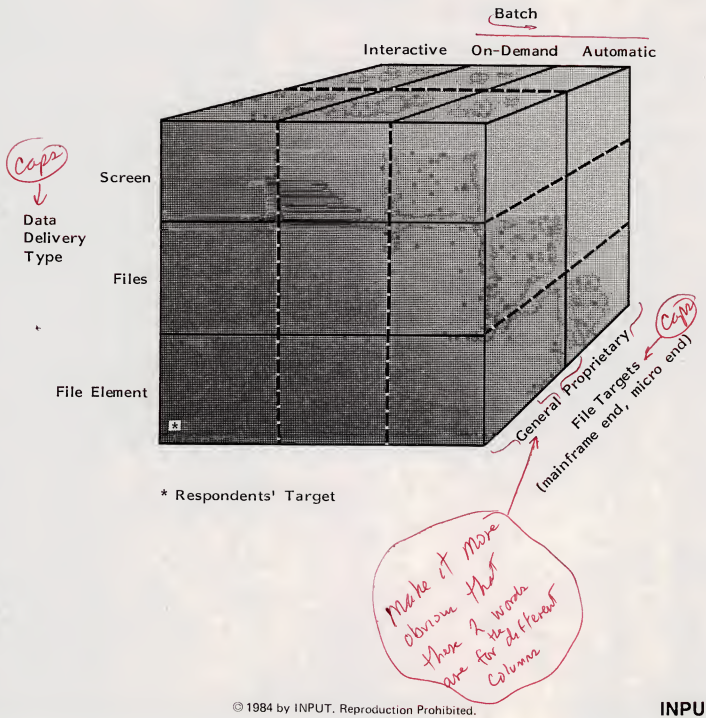

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EXHIBIT IV-9

CULLINET MICRO-MAINFRAME OFFERINGS
~~(Projected)~~ (Announced)

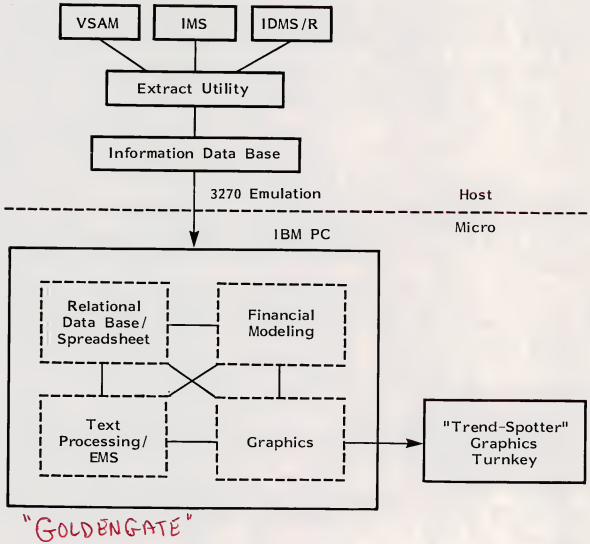

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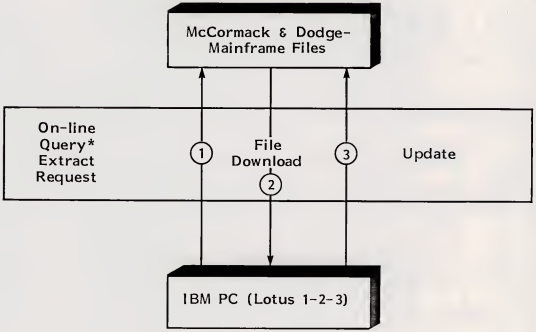
EXHIBIT IV-10

McCORMACK & DODGE MICRO-MAINFRAME OFFERING



* Non-McCormack & Dodge = Batch Mode

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EXHIBIT IV-11

INFORMATICS MICRO-MAINFRAME OFFERING (VISIANSWER)

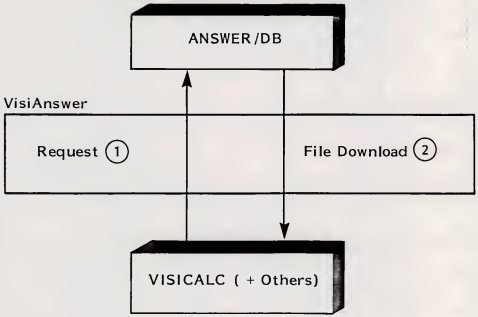

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EXHIBIT IV-12

COMSHARE'S SYSTEM "W"

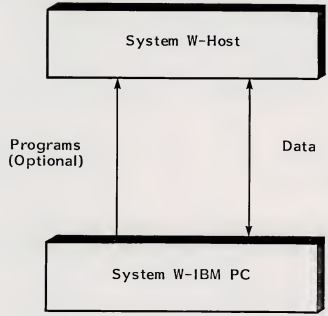

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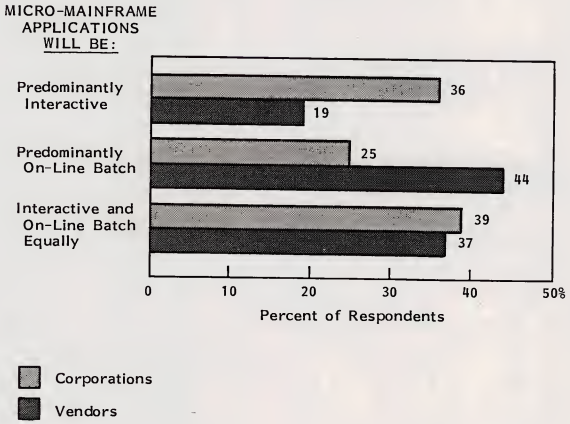
EXHIBIT IV-13

INTERACTIVE VERSUS ON-LINE BATCH MICRO-MAINFRAME APPLICATIONS:
CORPORATIONS AND VENDOR VIEWS



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DEVELOPMENT STRATEGIES FOR APPLICATIONS SOFTWARE FOR MICRO-MAINFRAME SYSTEMS: CORPORATE AND VENDOR VIEWS

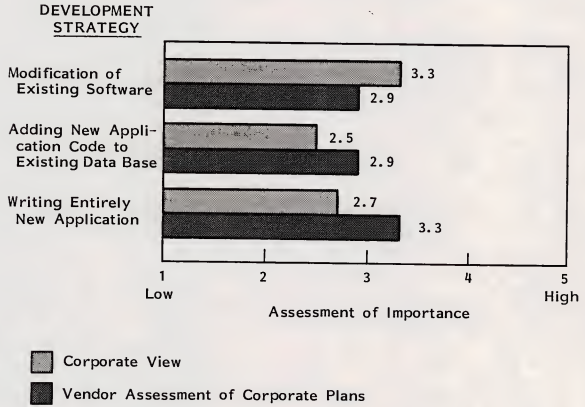

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EXHIBIT IV-15

EXTENT TO WHICH A PARTICULAR
DEVELOPMENT STRATEGY SUPPORTS OTHER STRATEGIES

(1) IF A COMPANY FAVORS	(2) THEN ITS RATING OF THE FOLLOWING IS: Modifying Existing Software	Adding Applications to Existing Data Base	Writing New Applications
Modifying Existing Software	N/A	2.5	2.7
Adding Application to Existing Data Base	3.5	N/A	3.2
Writing New Applications	3.2	2.4	N/A
Average Rating	3.3	2.5	2.7

Rating: 1 = Low Importance, 5 = High Importance

N/A = Not Applicable

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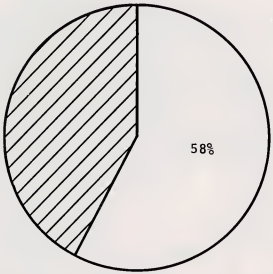
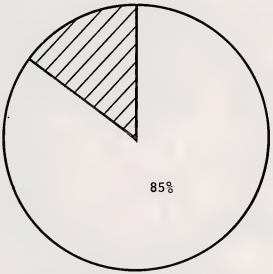
EXHIBIT IV-16

VENDOR INVOLVEMENT IN MICRO-MAINFRAME APPLICATIONS



Currently Implemented or in Development



In Planning or Concept Stage

Vendor Involvement In-House Implementation

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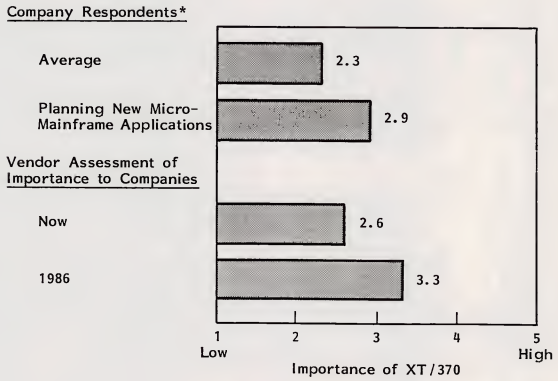
EXHIBIT V-1

FUTURE IMPORTANCE OF XT/370 TO SELECTED GROUPS



* Future Use

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EXHIBIT V-2

XT/370 AND UNIX:
FUTURE IMPORTANCE AND CURRENT UNDERSTANDING

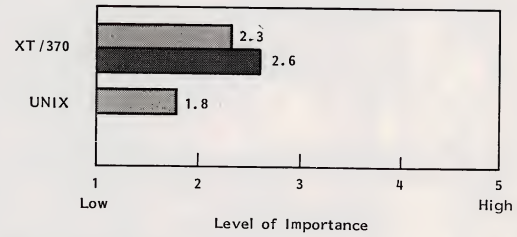

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EXHIBIT V-3

PROBLEMS IN MICRO-MAINFRAME CONNECTIVITY

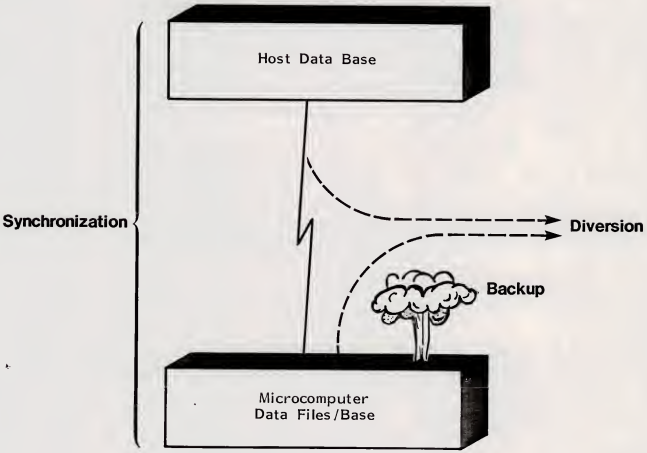

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EXHIBIT V-4

ADEQUACY OF SYSTEM IMPLEMENTATION APPROACHES

CRITERIA	RATINGS OF IMPLEMENTATION APPROACHES		
	TRADITIONAL MAINFRAME-BASED	MICRO-BASED	MICRO/ MAINFRAME-BASED
Data Linkage Across Applications	C-	D	D-
Application Transparency	C	A	B to D
Environmental Adaptability	C	D*	D*
Potential for Central Control	B	F	C
Flexibility in Meeting User Needs	C-	A	B to D
Stability	C+	D*	D*
Data Synchronization	C+	D	D
Operation Economy	C	A to D	B to D
Operation Speed	B	A to F	A to D
Implementation Speed	D	A	A to D-

Key: A = Meets criteria best
F = Does not meet criteria

* Potential for one or more grade improvement

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EXHIBIT VI-1

ON-LINE BATCH-DATA TRANSFERS

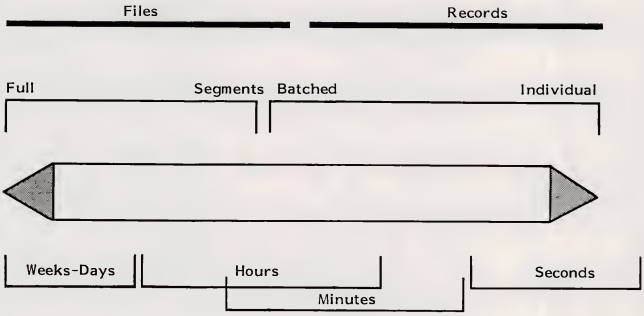

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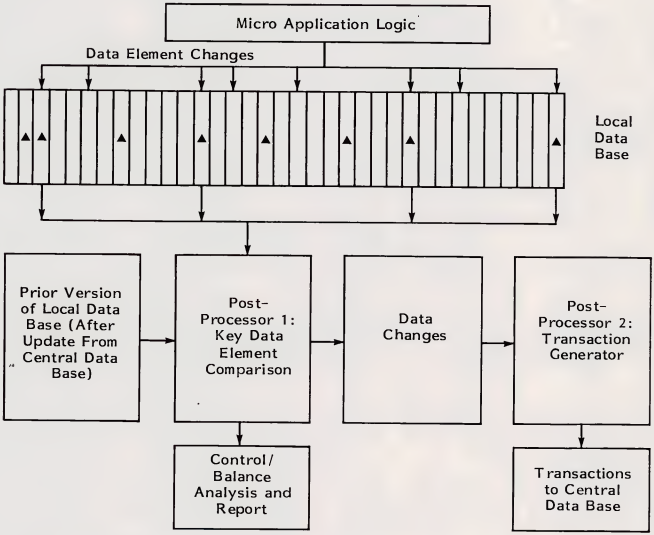
EXHIBIT VI-2

DATA BASE POST-PROCESSOR: LIMITS EXCESSIVE MICRO INDEPENDENCE



▲ = Data Elements Common to Host and Local Data Bases (Key Data Elements)

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EXHIBIT VI-3

ORGANIZATIONAL EVOLUTION INTO THE
MICRO-MAINFRAME ENVIRONMENT (Phase 1)

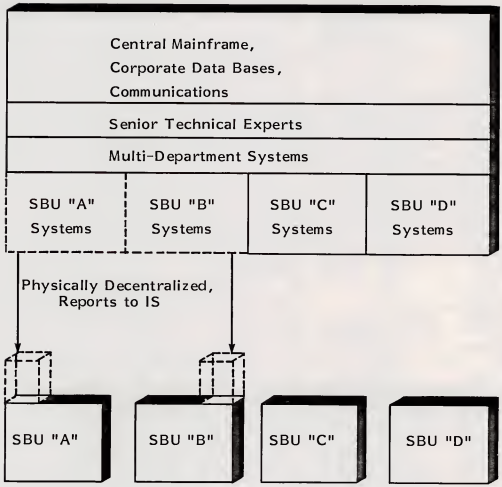

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EXHIBIT VI-4

ORGANIZATIONAL EVOLUTION INTO THE
MICRO-MAINFRAME ENVIRONMENT (Phase 2)

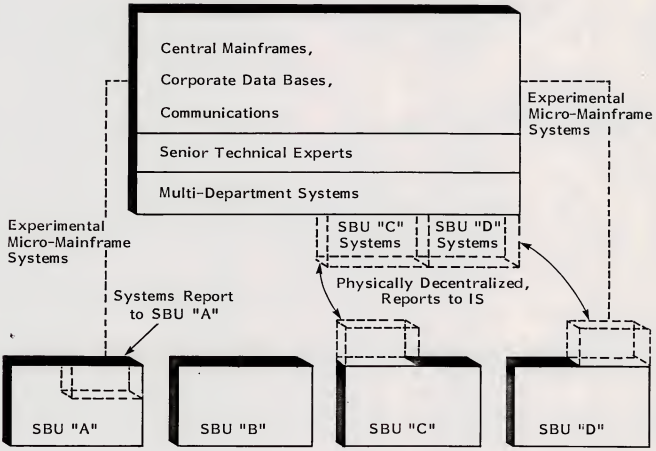

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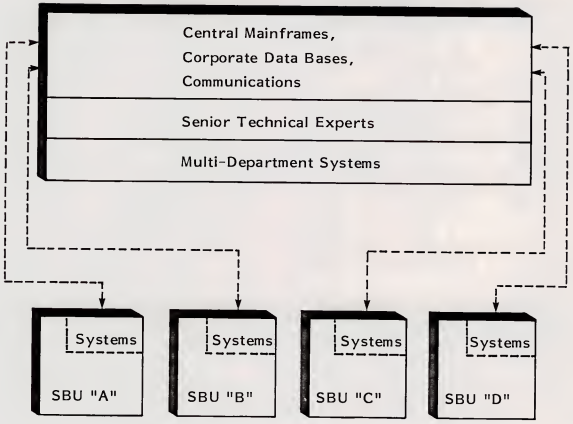
EXHIBIT VI-5

ORGANIZATIONAL EVOLUTION INTO THE
MICRO-MAINFRAME ENVIRONMENT
(Phase 3)



All "owned" application system functions are physically located in and report to their SBUs.

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EXHIBIT D-1

ORGANIZATIONAL AND INFORMATION SYSTEMS FACTORS AFFECTING ADVISABILITY OF INTRODUCING SERVICE AGREEMENTS

FACTOR	POSITIVE ELEMENT	NEUTRAL ELEMENT	NEGATIVE ELEMENT
Corporate Organization	Dynamic	Rigid	Unstable
Planning Receptivity	High		Low
Type of IS Organization	Centralized	Decentralized	Central Coordination
IS Personnel Capabilities	High		Low
IS Top Management Time in Office	Short	Medium, Long	
Hardware Capacity	Adequate		Inadequate
Telecommunications Reliability	High		Low
IS Time Estimating Track Record	Reliable		Unreliable
IS Performance Measurement Capabilities	High		Low

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EXHIBIT D-2

DISTINGUISHING KEY USERS FROM OTHER USERS

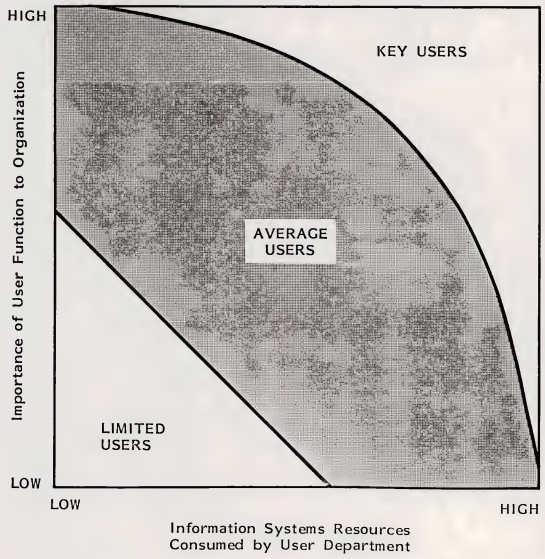

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EXHIBIT D-3

USER-RELATED FACTORS AFFECTING ADVISABILITY OF INTRODUCING SERVICE AGREEMENTS

FACTOR (Separate for Each User)	POSITIVE ELEMENT	NEUTRAL ELEMENT	NEGATIVE ELEMENT
Relations with User	Moderate; Bad, But Improving	Excellent	Moderate & Worsening; Bad
Amount of Outside Services Used	Increasing	Stable; Decreasing	
User Sophistication	High	Low; Medium	
Importance of EDP to User	High		Low
Proportion of IS Resources Used	High	Low; Medium	
Amount of User Involvement	High	Low; Medium	
User Satisfaction as Perceived by IS		Low, Medium, High	

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EXHIBIT D-4

SERVICE AGREEMENT CONTENT:
TERMINAL DOWNTIME CHECKLIST

- Definition, i.e., by type of malfunction
  - Local hardware
  - Communication line
  - Central hardware
  - System software
  - Applications software
- Uptime requirements by
  - Time period, e.g.,
    - Time of day
    - Day of week
    - Season
  - Location (geography, organization)
  - Equipment type
- Malfunction repair
  - Responsibility, by type of malfunction
  - Process
  - Equipment backup
- Measurement methodology, e.g.,
  - User problem logs
  - System monitors
- Measurement responsibilities
  - Reporting
  - Meetings

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EXHIBIT D-5

SERVICE AGREEMENT CONTENT:
RESPONSE TIME CHECKLIST

- Definition, i.e.,
  - Minimum
  - Maximum
  - Average (mean)
  - Average (median)
  - Percentile (e.g. 95th)
- Requirements by
  - Time of day
  - Time period (day of week, month, season, etc.)
  - Location (geography, organization)
  - Type of transaction
- Priorities by type of requirement
  - E.g., where contention/degradation occur
- Measurement methodology, e.g.,
  - System monitors
  - On-site stopwatch sampling
- Measurement responsibilities
  - Reporting
  - Meetings

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EXHIBIT D-6

SERVICE AGREEMENT CONTENT:
PROGRAM DEVELOPMENT REQUEST CHECKLIST

- Definition
  - Levels of requests
- Process
  - Forms
  - Information
  - Routing to be followed
- User responsibility
  - Screening
  - Prioritizing
  - Batching of requests
  - Benefit assessment
  - Benefit measurement
- Cost/benefit process
  - When to be applied
  - Payback criteria
- Feasibility study role
  - Content
  - Role of rapid prototyping
  - Turnaround
- Maintenance "release" cycle
  - Time period
  - Exception process

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EXHIBIT D-7

STEPS IN DEVELOPING USER SERVICE AGREEMENTS

1. Decide whether service agreements are advisable in the organization's environment.
2. Develop and tailor a concept for the specific organization.
3. Classify users into key, average, and limited-use categories.
4. Discuss concept with top management, key users, and selected average users.
5. Develop draft agreement guidelines.
6. Negotiate a pilot agreement with one or more average users.
7. Revise guidelines after pilot is in place.
8. Circulate revised guidelines to key users; modify as required.
9. Negotiate agreements with key users.
10. Negotiate agreements with remaining average users after arrangements with key users are working satisfactorily.
11. Negotiate agreements with limited users after all other agreements are in place.

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